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STRATEGOS:

A SERIES OF
MERICAN GAMES OF WAR
BASED UPON MILITARY PRINCIPLES
AND DESIGNED FOR THE
ASSISTANCE BOTH OF BEGINNERS AND ADVANCED STUDENTS
IN PROSECUTING THE WHOLE STUDY OF
*TACTICS, GRAND TACTICS, STRATEGY, MILITARY HISTORY, AND
THE VARIOUS OPERATIONS OF WAR.*

ILLUSTRATED WITH NUMEROUS DIAGRAMS.

TO WHICH IS APPENDED A COLLECTION OF STUDIES UPON
MILITARY STATISTICS
AS APPLIED TO WAR ON FIELD OR MAP.

BY
CHARLES A. L. TOTTEN,
FIRST LIEUTENANT, FOURTH UNITED STATES ARTILLERY.

IN TWO VOLUMES.
VOLUME II.—PLATES, TABLES, AND STATISTICS.

NEW YORK:
D. APPLETON AND COMPANY,
1, 3, AND 5 BOND STREET.
1880.

57722

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PLATES.

PLATE I.

EXAMPLES IN THE USE OF THE TACTICAL AND TOPOGRAPHICAL BLOCKS (¼ size).

Minor Tactics of "the Three Arms."

FIG. 1.

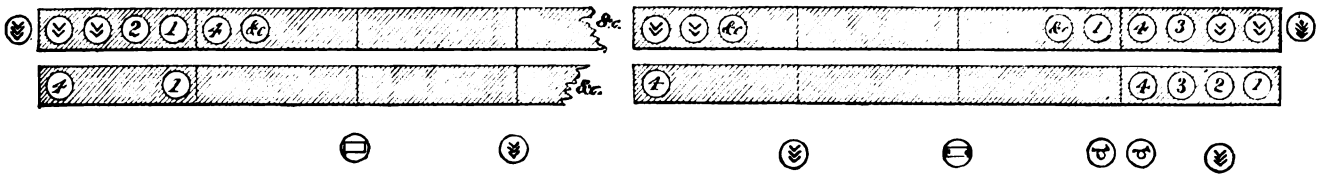


FIG. 2.

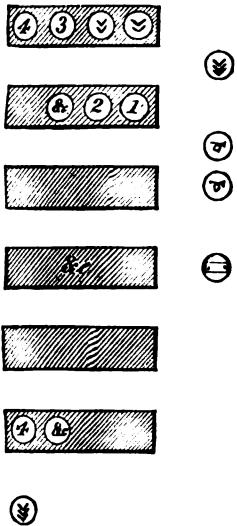


FIG. 3.

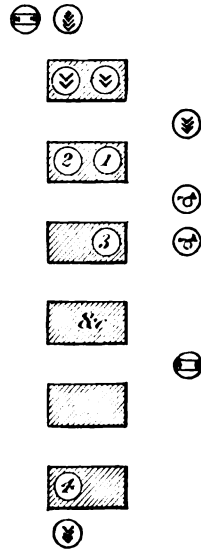


FIG. 4.

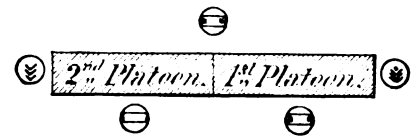
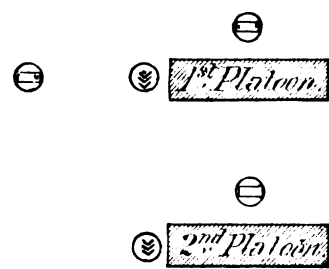


FIG. 5.



Grand Tactics, Strategy, Topography, Text-book Illustration, etc.

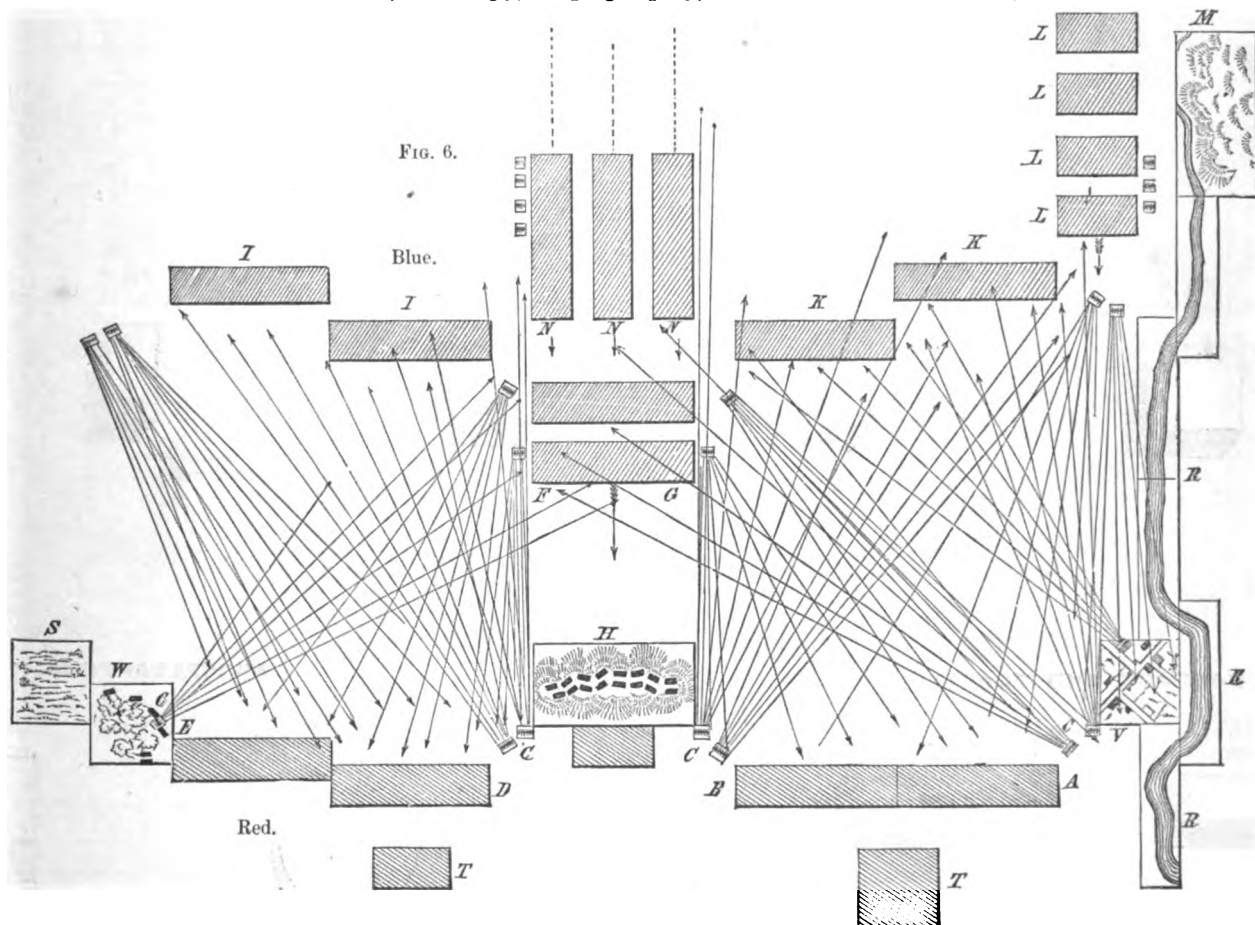


PLATE II.

MILITARY PIECES EMPLOYED IN BATTLE AND ADVANCED GAMES (full size).

INFANTRY.

LINE PIECES.

FIG. 1.
½ Regiment (500).

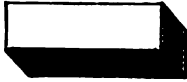
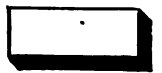


FIG. 2.
1 Division (2 Companies).



SKIRMISH PIECE.
FIG. 3.
1 Company (100).



CAVALRY.

LINE AND SKIRMISH PIECE.

FIG. 4.
1 Company (100).



FIG. 5.
1 Battalion (4 Companies) in column.



ENGINEER.

LINE PIECE.

FIG. 10.
1 Company (150), with Tools, etc.



ARTILLERY.

LINE PIECES.

FIG. 6.
1 Battery (6 guns).

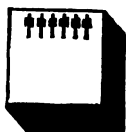


FIG. 7.
½ Battery (3 guns).



FIG. 8.
Caissons, etc. (1 battery).



FIG. 9.
Caissons, etc. (½ battery).



BAGGAGE AND TRAINS.

FIG. 11.
General Baggage.



FIG. 12.
Infantry Tools and Munitions.



MISCELLANEOUS.

FIG. 13.
Scouts, Messengers, etc.

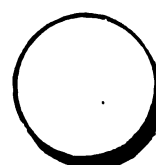


FIG. 14.
Colors.



PLATE III.

SLATED GAME-BOARD, USED IN BATTLE, ADVANCED, AND HISTORICAL GAMES.

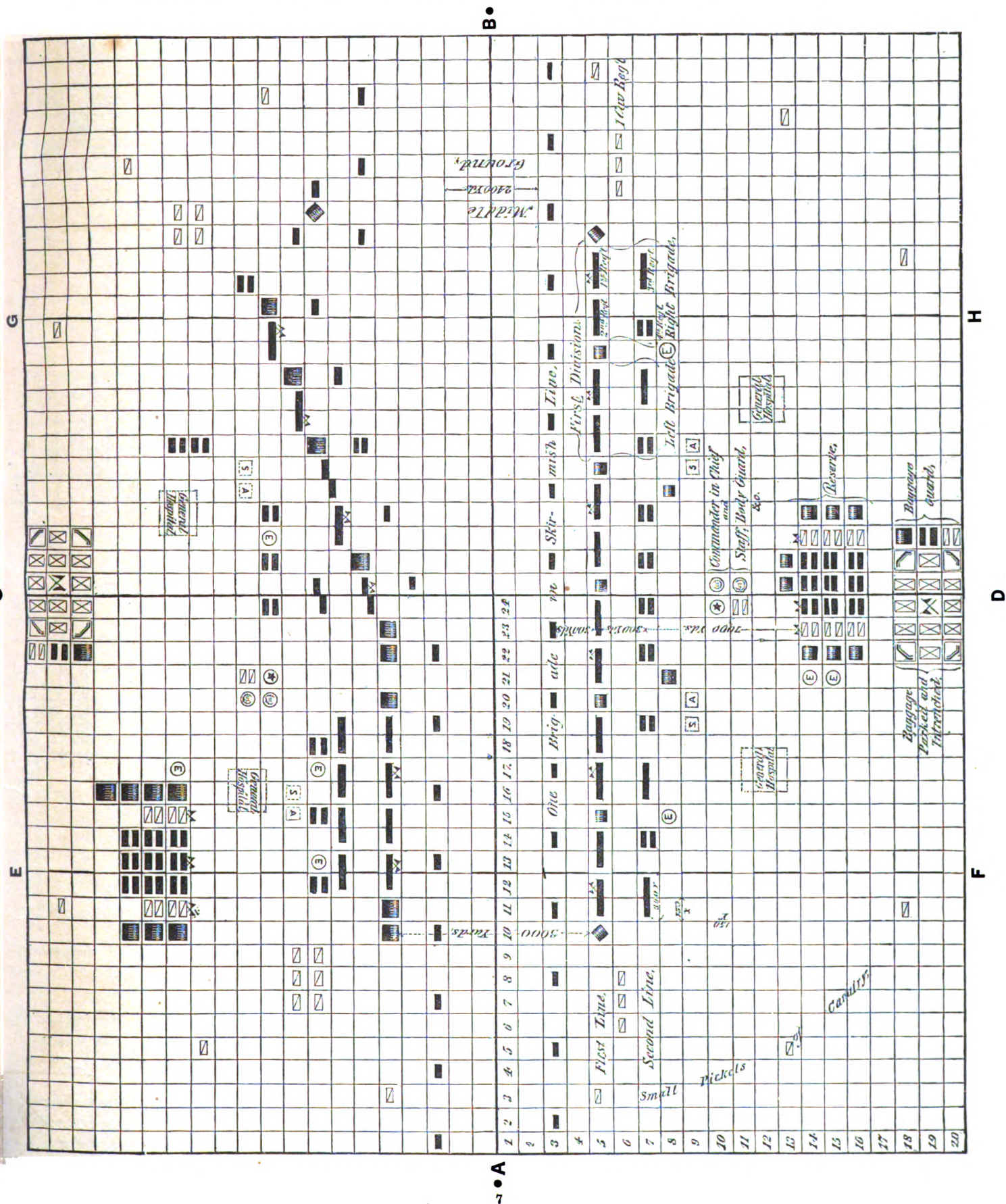


PLATE IV.

"MOVES" AND "POWERS" OF THE VARIOUS PIECES IN THE BATTLE GAME.

"MOVES."

FIG. 1.
"MANŒUVRE MOVE."

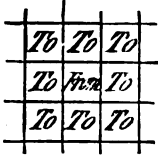


FIG. 2.
INFANTRY "REGULAR MOVE."

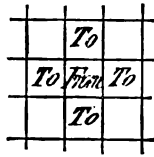


FIG. 3.
CAVALRY "REGULAR MOVE."

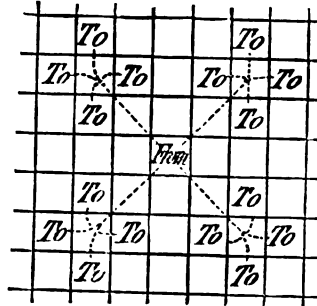
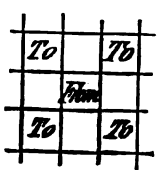


FIG. 4.
ARTILLERY "REGULAR MOVE."



"FIRE," "POWER," "CAPTURE," "CONTROL," ETC.

INFANTRY PIECE.
By Displacement (no "Dead-Spaces").

FIG. 5.

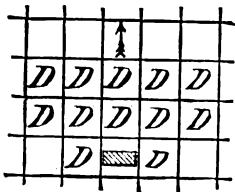
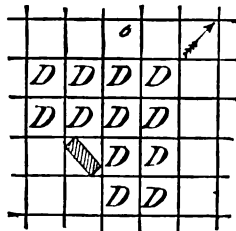


FIG. 6.



INFANTRY PIECE.
Capture without Displacement (i. e., by "Cross-Fire").

FIG. 7.

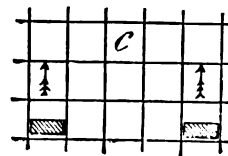
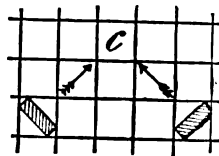
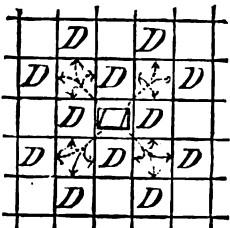


FIG. 8.



CAVALRY DISPLACEMENT.
FIG. 9.



FIRE OF ARTILLERY PIECE.
i. e., Without Displacement.

FIG. 10.

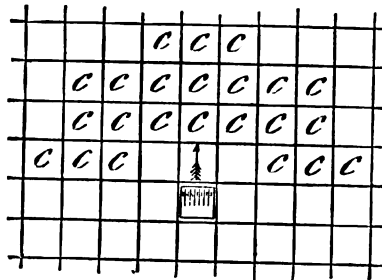
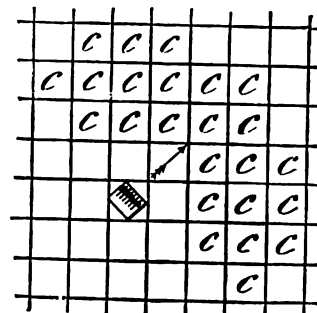
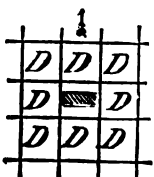


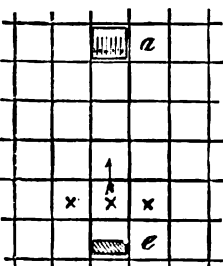
FIG. 11.



ENGINEER PIECE.
By Displacement.
FIG. 12.



ENGINEER "CONTROL."
FIG. 13.



FIRE OF THE FIELD WORK. (No "Dead-Spaces.")
FIG. 14.

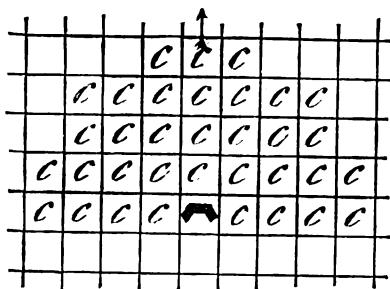
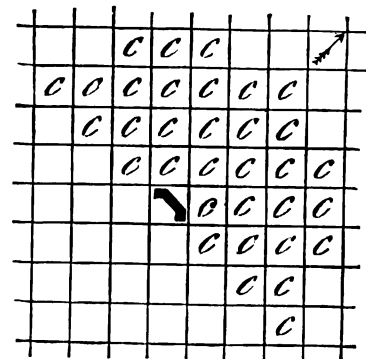


FIG. 15.



D=May move to and "dis-
place" (i. e., capture
from).

C=May "capture" with-
out moving to.

X="Controls,"

↑=Front of piece (i. e.,
according as the piece
faces directly or ob-
liquely on the board.)

PLATE IV (Continued).

"OUT OF ACTION," "IN ACTION," "NEUTRALIZATION," "PREPONDERANCE," ETC.

FIG. 16.

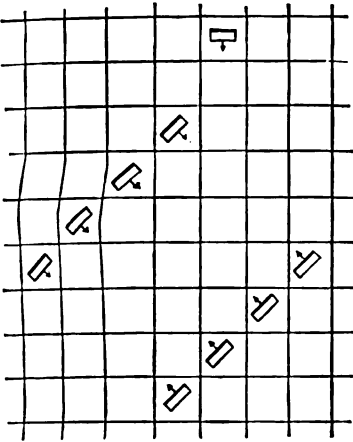


FIG. 17.

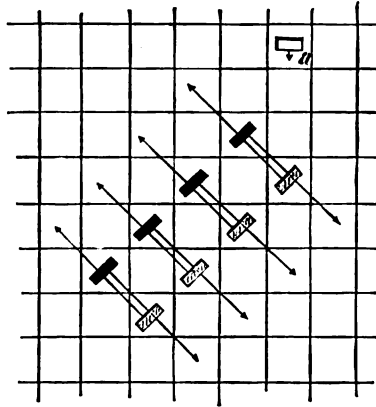


FIG. 18.

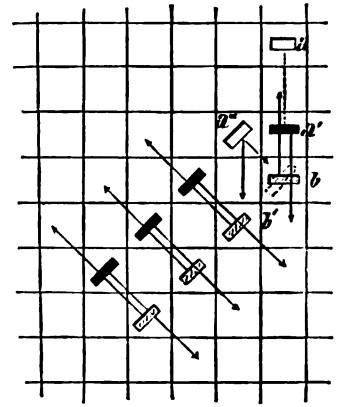


FIG. 19.

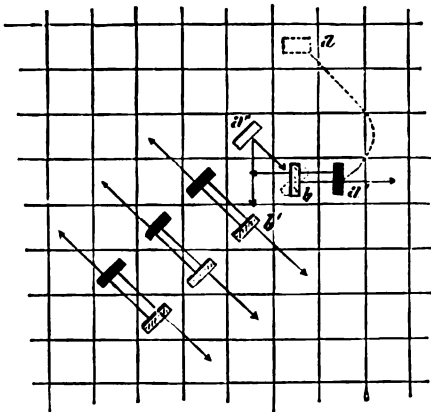


FIG. 20.

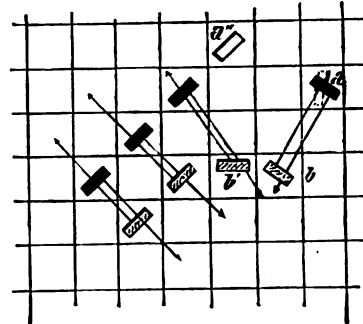


FIG. 21.

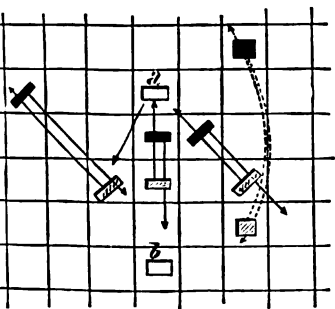


FIG. 22.

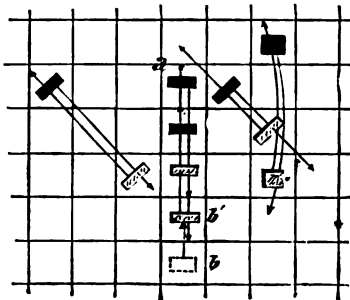


FIG. 23.

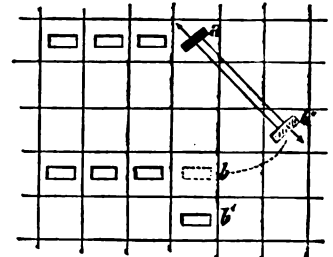


FIG. 24.

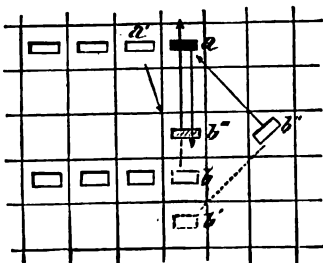


FIG. 25.

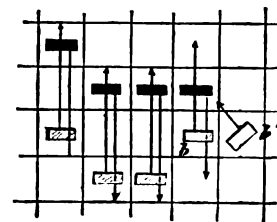


PLATE V.

FIG. 1.

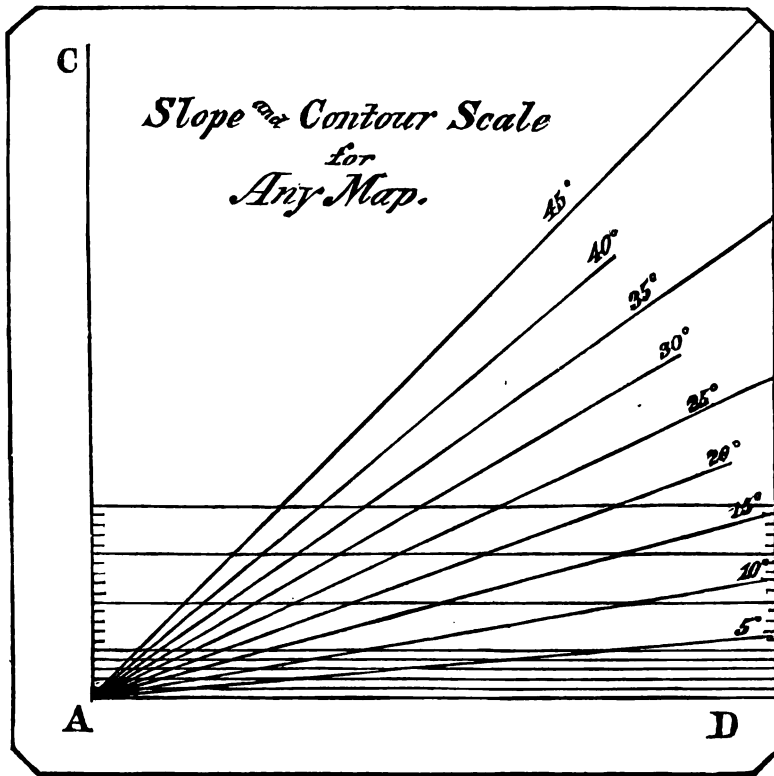


FIG. 2.



FIG. 3.

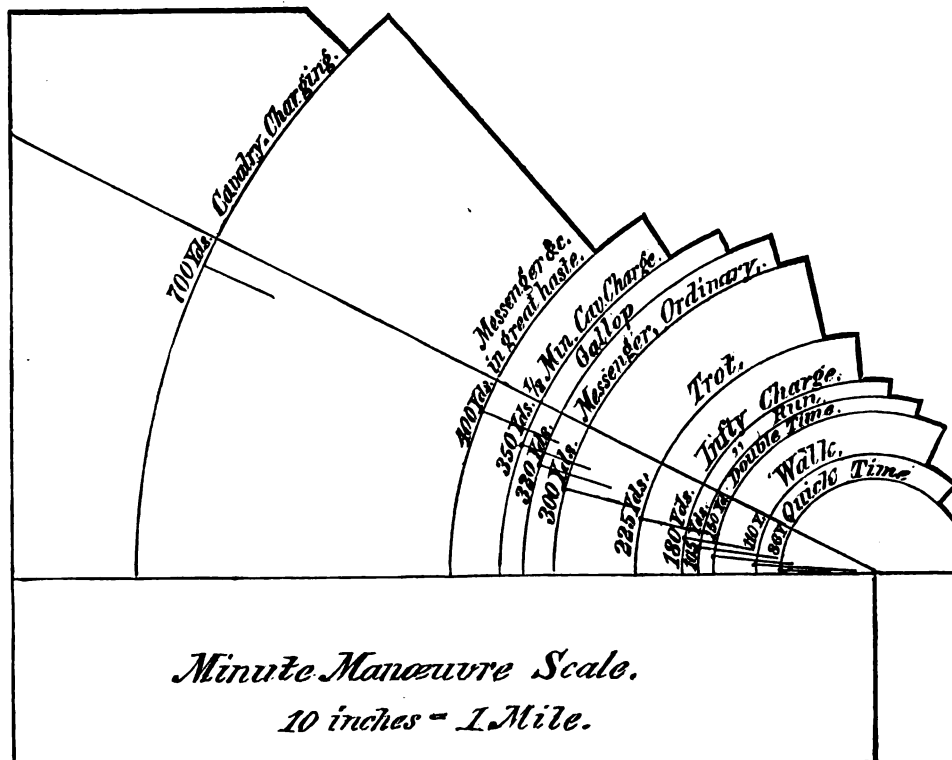


FIG. 4.
Measuring Calipers, Reduced one third.

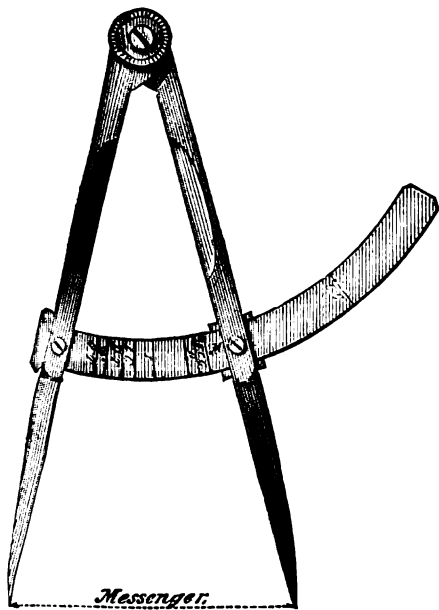


FIG. 5.

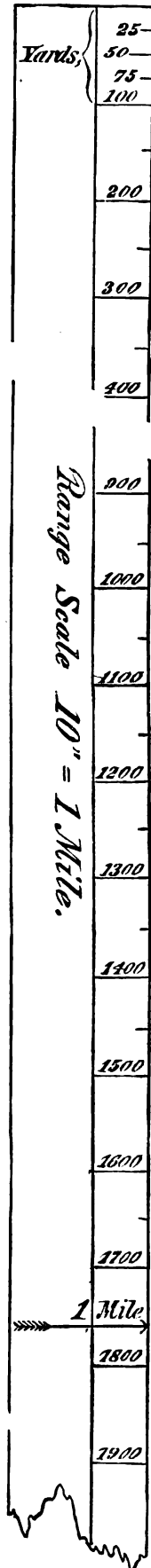


FIG. 6.

Firing Scales, Von Naumann's Kriegsspiel.

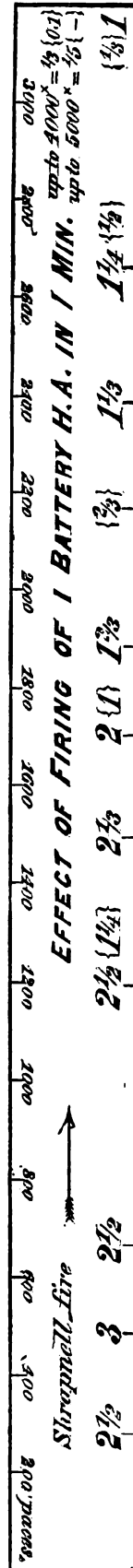


FIG. 7.

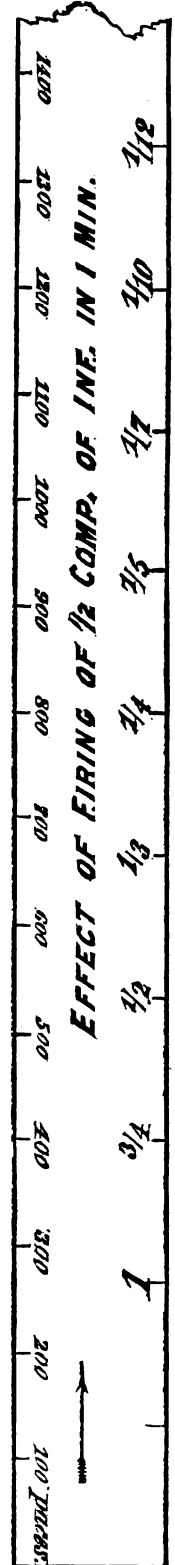


PLATE VI.

TACTICAL ARRANGEMENTS.

ADVANCED GAME.—MILITARY PIECES (full size) EMPLOYED.

INFANTRY.

FIG. 1.
1 Regiment in Line of Battle.

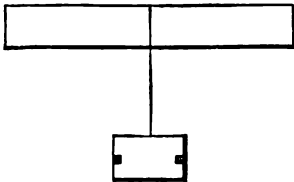


FIG. 2.
1 Regiment in Double Column of Fours.

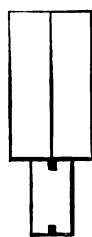


FIG. 3.
1 Regiment in Column of Fours.

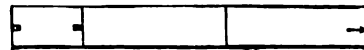


FIG. 5.
1 Regiment in Bivouac.

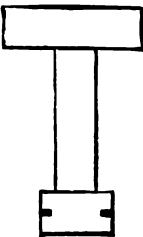


FIG. 4.
1 Regiment in Column of Route.

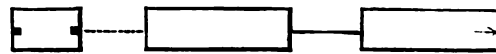


FIG. 6.
1 Regiment in Camp.

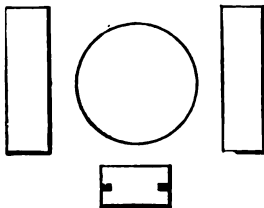


FIG. 7.
3 Companies in Thin Firing Line ($1\frac{1}{4}$ yards).

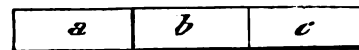


FIG. 8.
3 Companies in Heavy Skirmish Order ($2\frac{1}{2}$ yards).

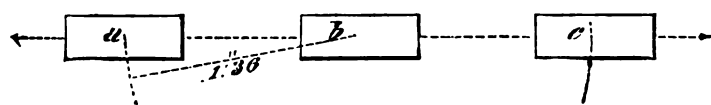


FIG. 9.
3 Companies in Thin Skirmish Order (5 yards).

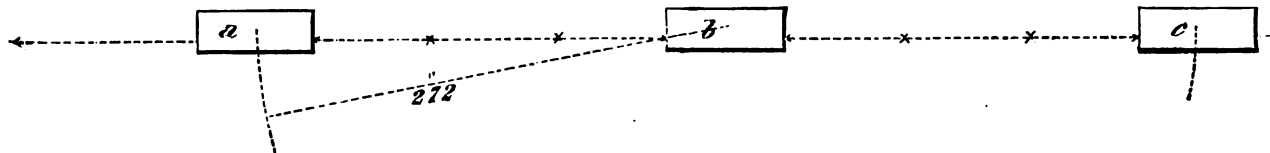
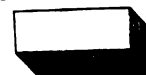


FIG. 10.
2 Companies in Heavy Firing Line.



FIG. 11.
4 Companies in Line of Battle.



TRAINS, BAGGAGE, ETC.

FIG. 26.
Parked.

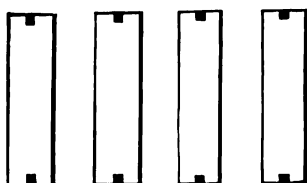


FIG. 27.
In column of Route.



CAVALRY.

FIG. 12.
1 Battalion in Line of Battle.



FIG. 13.
1 Battalion in Columns of Companies to the Front.

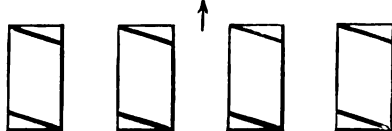


FIG. 14.
1 Battalion in Column of Route.



FIG. 15.
Battalion in Column of Fours.



FIG. 16.
1 Battalion in Column of Companies.

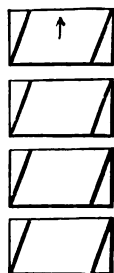


FIG. 17.
1 Battalion in Closed Columns.

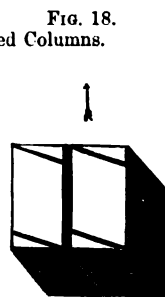
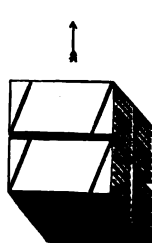


FIG. 19.
1 Battalion in Bivouac.

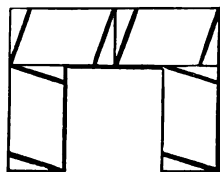
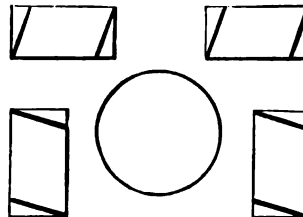


FIG. 20.
1 Battalion in Camp.



ARTILLERY.

BATTERIES AND HALF BATTERIES.

FIG. 21.
In Action.

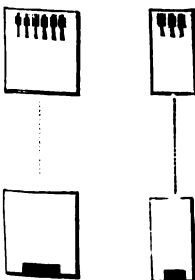


FIG. 22.
Column of Route.

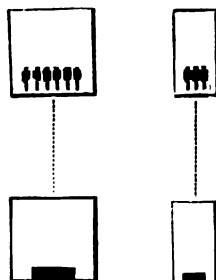


FIG. 23.
Tactical Columns.

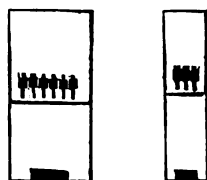


FIG. 24.
Parked.

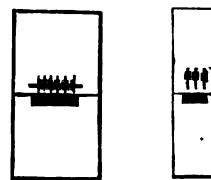


FIG. 25.
Camped.

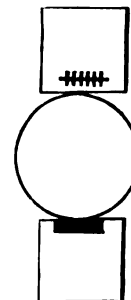


PLATE VII.

CHARACTER OF "MARKS," "SYMBOLS," ETC., TO BE PUT UPON THE SLATED
PIECES IN ADVANCED GAME.

FIG. 1.

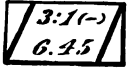


FIG. 2.



FIG. 3.

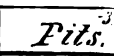
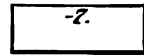


FIG. 4.

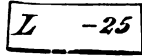


FIG. 5.

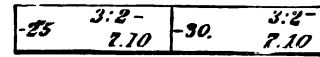


FIG. 6.



FIG. 7.



FIG. 8.

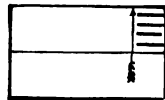


FIG. 9.



FIG. 10.



FIG. 11.




FIG. 12.



FIG. 13.




FIG. 14.

 Infantry Trenches.

 Infantry Trenches with Blindages.

 Shelter Trenches.

 Gun Emplacements.

 Lunettes.

PLATE VII (Continued).

FIG. 15.

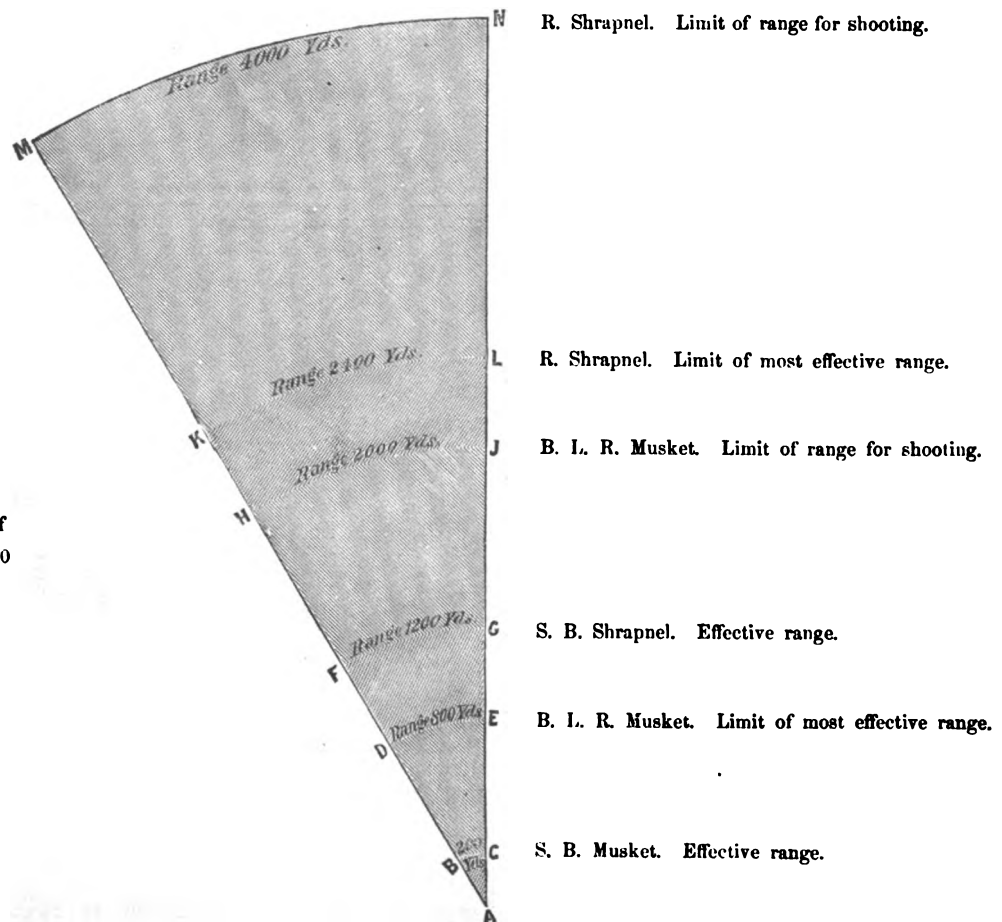
....176° (say 5 yds.)....

- | | | |
|------|--|----------------------|
| (1) |①..... | Thin Skirmish Line. |
| (2) | ...③.....③... | Heavy Skirmish Line. |
| (4) | ④....②....④....③.... | Thin Firing Line. |
| (8) | ④ ③ ② ① ④ ③ ② ① | Heavy Firing Line. |
| (16) | $\left\{ \begin{array}{l} ④ ③ ② ① ④ ③ ② ① \\ ④ ③ ② ① ④ ③ ② ① \end{array} \right\}$ | Line of Battle. |

DIAGRAM TO SHOW THE RELATIVE AREAS AFFECTED BY MUSKETRY AND ARTILLERY FIRE IN THE PAST AND PRESENT.

(From Frazer's "Gold Medal Essay.")

FIG. 16.



AREA—A. B. C. = 1

" A. D. E. = 16

" A. F. G. = 36 = 16 × 2

" A. H. J. = 100 = 16 × 6

" A. K. L. = 144 = 16 × 9

" A. M. N. = 400 = 16 × 25

The Martini Henry has an observed range of 2000 yards; and Field Guns range much over 4,000 yards, but produce no result.

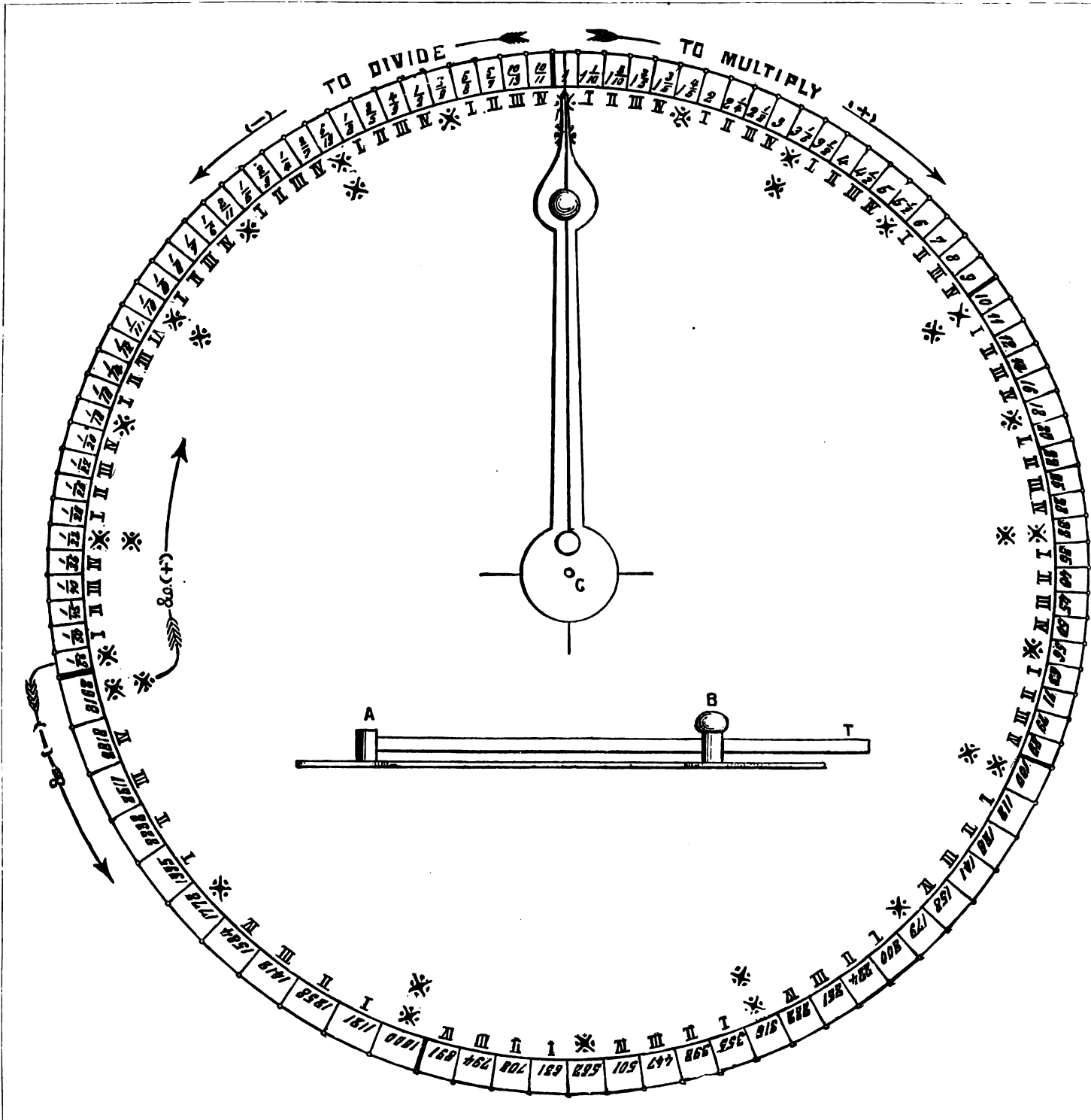
S. B. Canister ranged 500 yards.

PLATE VIII.

THE SOUNDING BOARD.—FOR APPROXIMATE MULTIPLICATIONS.

(See Appendix J.)

(Original.)



K E Y.

THE TOP ROW OF FIGURES REPRESENTS THE FACTORS, THE LOWER ROW THE CORRESPONDING NUMBER OF PINS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	30	35	40	45	50	60	70	80	90	100
0	6	9	12	14	16	17	18	19	20	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	30	31	32	33	34	36	37	38	39	40

T A B L E S.

TABLE A.—ORDER OF PROCEDURE.

THE following Order of Procedure for playing a single *Game interval* (corresponding to any length of time) comprehends the most complicated set of circumstances that can arise at any stage of an engagement, as, for instance, at its *crisis*. It will also be found to apply equally well to the simplest run of affairs. In the latter case everything but movements will most likely have to be omitted. Of course, in passing down the list, paragraphs which do not concern the particular interval (*turn*) in question are to be skipped.

This Order of Procedure is intended also to be a sort of *working index* to the Rules and Conduct of the Advanced Game.

(Original.)

1. The new *interval* is announced by the Referee, and properly recorded on Table B. (See ¶ 273.)
2. Recorded *Results and Consequences* of previous elementary victories and defeats, decisions of the Referee, etc., in so far as they concern the *turn* under consideration, are now to be *continued* under the superintendence of the Referee and Umpire. (See Tables G, H, I, L, and T, and ¶¶ 271, 284, 330.)
3. Each Commander (player) now states in succession (written, if necessary) what movements, etc., he desires to make—i. e., his *orders, intentions*, etc. (See ¶¶ 349 to 362, and 367 to 387.)
4. Such *Ordinary moves*, etc., as require no consultation of the dice are now effected (Tables D, E, F, G, and H) by the Referee and assistants. (See ¶¶ 371, 375, 383.*)
5. The various *ratios of Possibility*, etc., Table I (and S, where applicable), are now *calculated* by the Referee and Umpire (see ¶ 284 and Rule IV), and duly recorded in Table U.
6. *Possibility* is now to be determined by the dice (¶ 359, Table J, Rule V, ¶ 289, or Table K, Rule VI, ¶ 291), and the result recorded for future reference when necessary (¶ 363).
7. Such *moves*, etc., as are thus made possible or necessary, are now effected (Tables D, E, F, G, H, and I).
8. *General losses* due to distant fire are now calculated (Tables M, N, O, P, Q, and R), and recorded upon the pieces, pieces being removed from the maps when necessary (¶ 292, etc., 310, etc.).
9. *Chances of Success* in the several elementary and special *hand-to-hand conflicts* that commence this *turn*, or that are in progress, are now *calculated* by the Referee and Umpires (Table S, Rule IV, ¶ 321, etc.) and recorded (Table U, ¶ 363).
10. The question whether such *final rushes* and *hand-to-hand conflicts* shall terminate during the *turn* under consideration or not, is now settled (see note at the heading of Table S) by the dice, and, when the decision as to results, etc., is to be postponed to some future moment, proper records (¶ 243) are made to that effect. (See also Table of Duration [L], Case 12).
11. *Victory and Defeat* (in the case of such *hand-to-hand conflicts* as are thus [10] brought to termination) are now determined by reference to the dice thrown under Rule VIII (¶ 330, Table T; see description of that Table and notes thereon), and the *defeated* pieces turned *upside down*, etc., proper records being made when necessary (¶ 244).
12. *Losses* in *hand-to-hand conflicts*, if such take place, are now calculated (Table T) and recorded on the slated *men*, pieces being removed from the maps when necessary (¶ 320 and note thereunder).
13. *Results and Consequences*, in so far as they concern the *turn* under consideration, are now *put in operation* (Table T), and such of them as will continue over to future *turns* are properly recorded (¶¶ 244, 330, etc.).
14. *Final corrections*, etc., are now called for, and the *turn* declared closed by the Referee.

* The sending out of messengers, scouts, the *opening of fire*, the receipt of orders, messages, spies, etc., should generally be attended to under this division, when possible.

TABLE B.—FOR RECORDING GAME INTERVALS IN TIME.

(Original.)

Numbers.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Months.	•	•	•	•	•	•	•	•	•	•	•	×																		
Days.	•	•	•	•	•	•	×	•	•	•	•	•	×	•	•	•	•	•	•	•	×	•	•	•	•	•	•	×	•	•
Hours.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	×							
Periods.	•	•	•	•	•	•	•	•	•	•	•	×																		
Minutes.	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×
	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×	•	•	•	•	×

RULE FOR RECORDING TIME BY MEANS OF TABLE B.

RULE III. 1st. Place *black* marking pins in the squares opposite the numbers indicating the month, day, hour, etc., at which operations commence, which pins will not thereafter be moved. 2d. Follow with *white* pins the various intervals as they transpire. The separations of these pins will indicate at any moment the time already expired, and the position of the white pins the exact moment under consideration.

TABLE C.—DEPTH OF VARIOUS COLUMNS.

(Original calculation and compilation.)

CASE.	CHARACTER OF COLUMN. NOTES, REFERENCES, Etc.	DEPTH.
INFANTRY.		
1.	Company in Column of Fours, Twos, Files, etc.....See Infantry Tactics and Hand-books.	33 yards.
2.	" " Platoons....." " " "	23 "
3.	Regiment " Fours, Files, etc....." " " "	325 "
4.	" " Platoons....." " " "	313 "
5.	" " Companies....." " " "	296 "
6.	" " Divisions....." " " "	265 "
7.	" " Mass (Companies)....." " " "	58 "
8.	" " " (by Divisions)....." " " "	37 "
CAVALRY.		
9.	Squadron (Company 100 men), in Column of Fours, Twos.....See Cavalry Tactics and Hand-books.	100 to 111 yards.
10.	" " " Double Column of Fours....." " " "	55 to 65 "
11.	" " " Column of Platoons....." " " "	63 to 75 "
12.	Battalion (4 Companies), in Column of Fours, Twos....." " " "	400 to 460 "
13.	Regiment (3 Battalions), " " " "....." " " "	1,225 to 1,340 "
ARTILLERY.		
14.	Foot Battery (3"-R. or 12-Pdrs., etc.), in Column of Sections (without baggage).....See Artillery Tactics, Hand-books, and Wolsley.	190 yards.
15.	" " " " (with baggage)....." " " "	225 "
16.	Horse Battery (6 guns), in Column of Sections (without baggage)....." " " "	244 "
17.	" " " " (with baggage)....." " " "	300 "
18.	Foot Battery, in Column of Platoons (without baggage)....." " " "	94 "
19.	" " " " (with baggage)....." " " "	110 "
20.	Horse Battery, " " (no baggage)....." " " "	121 "
21.	" " " " (with baggage)....." " " "	175 "
LARGE BODIES OF TROOPS.		
22.	Infantry Division (without baggage, i. e., as integral part of a Corps) Column of Route.....	5,766 yards.
23.	" " Independent, with baggage, and disposed for march toward the enemy (Route).....	12,000 "
24.	Infantry Brigade (with tools and extra ammunition) Column of Route.....	1,230 "
25.	" " (with all baggage save tents) " ".....	1,638 "
26.	" " (with all necessary transportation) " ".....	1,782 "
27.	An Army Corps, Independent, 47,000 effective, duly disposed on one road, and all allowances made for intervals, lengthening out of Column, etc.....	36 miles.
28.	Baggage Column of the above (included in the above estimate).....	10 "
MISCELLANEOUS.		
29.	Reserve Ammunition Train (Division of Infantry), Independent.....	790 yards.
30.	" " " (Army Corps), Independent (divided into 3 Sections, each 530 yards).....	1,590 "
31.	Field Telegraph Train of an Army (divided into 4 Sections).....See Case 1, Table H.	225 "
32.	" " " (Corps or Division), 1 Section.....See Case 1, Table H.	60 "
33.	Pontoon Trains, Reserve Equipage, 5 Divisions.....See Case 2, Table H.	1,800 "
34.	" " " " 1 Division = 4 Sections.....See Case 2, Table H.	380 "
35.	" " " " 2 Sections.....See Case 2, Table H.	190 "
36.	" " Advanced Guard Equipage, 4 Divisions.....See Case 2, Table H.	1,120 "
37.	" " " " 1 Division.....	280 "
38.	Baggage Columns, 1 Regiment of Infantry (all transportation included).....	184 "
39.	" " 1 Battalion of Cavalry " ".....	166 "
40.	Siege Train (Robert's Hand-book, pp. 43, 191-193).....	1½ to 2 miles.
41.	A 2-horse wagon, including 4 yards from heads of lead horses to rear of preceding wagon.....	12 yards.
42.	A 4-horse " " " " " " " ".....	16 "
43.	A 6-horse " " " " " " " ".....	20 "
44.	Absolute depth of 1 Field-piece and 6 horses.....See Artillery Tactics.	14 "
45.	" " 1 Caisson " ".....	14 "
46.	" " 1 Limber " ".....	11 "
47.	" " 1 Mounted detachment (Horse Battery).....	7 "

NOTE 1. As a general rule, *opening out* can not be avoided. Add, therefore, where not specified, 20 per cent. as the average.

" 2. The roadway occupied by Divisions and Corps, acting independently and near the enemy, may be calculated by allowing 1,308 yards per 1,000 men of aggregate strength. This includes the baggage, which may be estimated as occupying 375 yards per 1,000 men.

" 3. A Division, marching as an integral part of a Corps, occupies about 720 yards of roadway per 1,000 men (20 per cent. for lengthening out being included but baggage left out).

" 4. Colonel Colley's rule for determining length of roadway occupied by Columns on the march gives very close estimates (Wolsley). It is: "Allow 1 yard every horseman, ½ yard for every foot soldier, and 20 yards for each wagon of every description."

" 5. "Roads are rarely sufficiently broad to allow of Cavalry moving by fours, as a certain margin must always be allowed for the passage of orderlies, staff officers, etc. Colonel Lewal says that, of 109 roads in Germany, only 25 are 29 feet broad or over." The front occupied by Cavalry in fours is about 24 feet.

TABLE D.—OF SLOPES,

VIN GRADATIONS ADMITTING OF MANŒUVRES [ADAPTED FROM M. LEHMAN, AS QUOTED BY SIR GARNET WOLSELEY].

ARM.	5°	10°	15°	20°	25°	30°
INFANTRY.	May move with order, and has <i>down</i> hill the most effective fire and charge.	Its close movements become more difficult. Fire much more effective <i>down</i> than up hill.	Can not move any considerable distance with order. Fire up hill without effect (i. e., <i>poor effect</i>). May secure good effect as skirmishers.	Can not move in order, and can fire only singly with effect down hill; i. e., as skirmishers.	In light or skirmish order only, as before.	Skirmish order only, as before.
CAVALRY.	May move with order, and has <i>up</i> hill its most effective shock.	May only canter down hill; the <i>charge</i> possible only <i>up</i> hill.	May still <i>trot up</i> and <i>walk down</i> hill.	May still ascend at a walk, and descend without order, but only obliquely.	Light cavalry may ascend one by one at a walk, obliquely, and descend in the same way, but with much difficulty.	Light cavalry only may ascend obliquely, with the utmost difficulty, and when the ground is soft.
ARTILLERY.	Can move with order. Has more effectual fire <i>down</i> than up hill.	Moves with difficulty. Its effectual and constant fire ceases.	Moves with great difficulty. The fire totally ceases.			

TABLE E,

SHOWING THE VARIOUS DISTANCES, IN MILES, THAT CAN BE MARCHED OVER BY "THE THREE ARMS," SEPARATELY AND COMBINED, IN **CAMPAIGNING**.

(Original.)

CHARACTER OF TROOPS.	INFANTRY.		CAVALRY.		ARTILLERY.						COLUMN OF ALL ARMS.†	
	RATE OF MARCH.*		RATE OF MARCH.*		MOUNTED.		HORSE.		HEAVY.		RATE OF MARCH.*	
Route march.....	2½	12	3	10-15	2½	12	3	15	2	10	2	12
Average ".....	3	15-20	3½	15-20	3	15-20	3½	15-20	2½	12	2½	12-20
Forced ".....	4	20-30	7½	20-30	4	20-25	7½	20-25	2½	16	3	20-25
Forced to utmost.....	5	30-35	11	30-40	5	25-30	11	25-35	3	20	4	25-30

Compiled from U. S. Regulations, Tactics, Authorities, and Experience, q. v. Consult also Wolseley, Hamley, Pierron, etc.

* Referee will decide in exceptional cases.

† Impedimenta included.

NOTES.—N. B. In studying maps add about 25 to 30 per cent. for the minor sinuosities of the roads, which can not of course be represented thereon.

"In extensive operations, when large bodies have to be moved, not more than 10 miles a day for continuous marching can be calculated on." "In large, combined operations, the time should be calculated at 2 miles an hour only." "For a force not stronger than a Division, moving by one road, the length of ordinary marches could be from 12 to 15 miles a day for 5 days out of 6, or, at most, 6 days out of 7."—WOLSELEY.

"Baggage trains, under a good military organization, can do 3 miles an hour well, and from 90 to 100 miles a week. A 25-mile march for the train should be exceptional." "With civilian transport, 2 to 2½ miles per hour only can be counted on for large trains."

TABLE F,

SHOWING THE DISTANCES OVER WHICH THE VARIOUS ARMS CAN "MANŒUVRE" UPON THE **BATTLE-FIELD**.

(Original.)

GAIT.	INFANTRY.		CAVALRY.		ARTILLERY.			MIXED TROOPS.
	Yards per Minute.	Miles per Hour.	Yards per Minute.	Miles per Hour.	MOUNTED.		HORSE.	
					Yards per Minute.	Miles per Hour.	Rates.	
Quick time and walk.....	86*	2½	110	3	86-110	2½-3	About the same as Cavalry, q. v.	About the same as Infantry, q. v.
"Double" and trot.....	150†	4½	220 ^a	6	†150-220 ^a	4-6½		
Run and gallop.....	165 ^c	5½	320 ^b	10½	^c 165-320 ^b	5-10½		
Charge.....	180 ^d	?	700 ^e	?	^d 180-700 ^e	?		

This Table is compiled from U. S. Experience, Regulations, Tactics, and Authorities, q. v.

* Infantry in bad bottom, heavy timber, etc., can not make much over 50 yards a minute. Advancing firing ("off hand" or "kneeling") over normal ground, infantry may move about 50 yards a minute. When advancing from cover to cover by successive rushes, and firing at each lying down, etc., a general line advances on an average of 20 to 25 yards a minute. For modifications due to slope, see Table D.

† Three minutes in eight allowed, and more rapid gaits similarly restricted.

‡ Suitable gaits alternated to accomplish (very exceptional, and for small bodies only).

^a Ten minutes in twenty allowed at this gait (10 minutes' trot to be followed by 10 at a walk).

^b Five " " twenty " " " " (5 at a gallop, 10 at a walk, 5 at a trot).

^c One minute " " ten " " " " (6 at a quick, 1 at a double, 2 at quick, 1 at a run), and a rest of 5 minutes.

^d One " " ten " " " " (3 at quick time, 1 at a double, 4 at quick time, 1 at a double, 1 at a charge), and a rest of 10 minutes.

^e One " " twenty " " " " (6 at a walk, 10 at a trot, 3 at a gallop, and 1 at a charge).

f Referee must decide exceptional cases.

(Original ~~copy~~ ation.)

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TABLE G.—TIME REQUIRED FOR VARIOUS PURPOSES (*Continued*).

[illegible]

TABLE H.—MISCELLANEOUS NOTES, ETC.

(Original compilation.)

CASE.	CIRCUMSTANCES, DATA, REMARKS, REFERENCES, Etc.
BRIDGE EQUIPAGE, Etc. <i>Reserve Train.</i>	
1.	(See U. S. Bridge Manual, 1870, Government Printing Office, Washington, D. C.) Consists of 4 Pontoon Divisions and 1 Abutment Division, 78 wagons in all. Carries 32 Pontoons (wooden); can construct 300 yards of bridge (44 bays). Requires 1 Company of Engineers (150 men and officers). 1 <i>Pontoon Division</i> consists of 4 <i>Sections</i> (2 Pontoon and 2 Abutment Sections), 16 wagons in all. Carries 8 boats, can construct 225' of bridgeway (11 bays), requires 60 Engineers (officers and men). 2 <i>Pontoon Sections</i> (1 of them Abutment) are often detached. This train consists of 8 wagons in all, carries 4 boats, constructs 112' of bridge (5½ bays), and requires 40 Engineers.
<i>Advance-Guard Equipage.</i>	
2.	These trains are composed of 4 Pontoon Divisions, each of which consists of 2 chess, 2 trestle, 1 tool, and 1 forge wagon (14 wagons), and carries 8 pontoons (canvas). Hence the complete train contains 56 wagons. It constructs 300 yards of bridge.
3.	NOTES.—“The wooden pontoon train, through four years of war, during which the bridges constructed were without parallel in number and magnitude, amply fulfilled all the requirements of a good bridge equipage.”—U. S. B. M., p. 15. “The wooden pontoon is about 9½ tons burden, and has sufficient capacity to transport 40 men fully armed and equipped, besides its crew of pontooniers.”—U. S. B. M., p. 27. “No firing is allowed from the boats; horses can swim at a trip with a boat.”—U. S. B. M. “A company of pontooniers, well equipped with tenpenny nails, 4 to 6 inch spikes, cross-cut and hand saws, can in a few hours improvise a good trestle bridge over any stream with a gentle current and not over 6' deep.”—U. S. B. M.
4.	“Haupt's celebrated bridge (trestle) over the Potomac River, constructed by the soldiers of the Army of the Rappahannock (McDowell's command) is the most remarkable specimen of bold military engineering of modern times. It was four stories (80') high, 400' long, withstood several freshets and severe storms without injury, and carried daily from 10 to 20 heavy trains both ways. It was built in 1862, in 9 working days, out of rough-hewn timber cut near by.”—CULLUM.
5.	“One half an hour burning is generally sufficient to render a bridge, without repairing, impassable to an enemy.”—CULLUM.
SIGNAL TRAINS, Etc.	
6.	The <i>Field Telegraph Train</i> for a corps or army consists of 9 wagons proper (1 battery, 4 wire, and 4 lance wagons). It carries 50 miles of telegraph line, which may be utilized to construct 4 separate lines (12 miles each) at once. The whole train requires about 150 officers and men.—Sig. Man.
7.	The <i>Section Telegraph Train</i> (one fourth of Field Train) consists of 3 wagons (1 battery wagon extra), carries 12 miles of wire, and requires 1 lieutenant and 45 men to erect and operate.—Sig. Man., 1879.
8.	“An average speed of 3 miles per hour has been had over fair ground with the Section Train.”—Sig. Man., 1879.
FORDS.	
9.	Depth of stream fordable by Infantry = 3', if current be gentle = 4'; by Artillery = 2' 4", if boxes be lifted, wrapped in paulins, etc. = 3'; by Cavalry = 4' 4". See U. S. Artillery Tactics, §§ 1180 and 1181; Soldiers' Pocket-book, page 170, etc.
10.	NOTE.—In 1797 the French crossed the Tagliamento in “order of battle,” and attacked and defeated the Austrians. Other celebrated crossings by fords might be mentioned, as that of Alexander at the Granicus, etc.
11.	In the passage of fords Infantry will generally make the best progress, Cavalry next, and Artillery the slowest. The difficulties increase of course when the passage is contested.
ICE.	
12.	Thickness necessary to bear Infantry = 2" to 3"; Cavalry and Light Artillery, 4" to 7"; Heavy Field Artillery, Baggage, etc., 5" to 8". See U. S. Artillery Tactics, § 1183; Soldiers' Pocket-book, p. 169; Welcker's Military Lessons, p. 67, etc.
13.	The Light Cavalry of the French, manœuvring on the ice in the winter of 1794-'95, captured a fleet of ships in Holland!
RAILROAD STATISTICS, Etc.	
14.	See Table “s,” Appendix G.

TABLE I.—OF POSSIBILITY

TO ADVANCE, RETREAT, MAINTAIN POSITION, ETC.

(Altered to date from foreign tables.)

CASE.	CIRCUMSTANCES, QUESTIONS, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
1.	Other things being equal, a simple question of "POSSIBILITY" may be decided by an appeal to the dice, the chances being taken as per circumstances under consideration.	....	....	Questions of Possibility will arise most frequently around incidents which obtain beyond the sphere of a "final rush." All such questions may be readily decided by an appeal to the dice under a suitable ratio, and to suggest some such ratios is the object of the present table. These ratios may be altered for sufficient cause; and <i>when the table fails to apply, the Referee must decide upon the ratios to be employed.</i> As a general rule, the question of <i>loss</i> incurred will determine <i>when</i> , at the tabulated ranges, it shall be necessary to consult this table.
2.	INFANTRY versus INFANTRY on open ground: Can a further advance be made? 800 to 500 yards. 500 to 300 " 300 to 200 " 200 to 100 "	Even. 3:2 2:1 3:1	STATIONARY INFANTRY.	Infantry may advance against other infantry up to 800 yards, and within this distance, provided its <i>losses</i> do not exceed 20 per cent. of strength, without reference to this table. Within this distance, and with 20 per cent. of loss, the table must be consulted at each specified distance. If the decision is favorable, the advance will be made at proper rates (Tables D, E, and F); if unfavorable, the assailant may try again at geometrically increasing intervals (1, 2, 4, 8, etc., minutes). A decision adverse to further advance does <i>not</i> necessarily oblige the assailant to retire <i>immediately</i> , but at the expiration of the proper interval (Case 16, Table L), one or the other force must retire to cover, or beyond 1,500 yards, "shaken," etc., as the Referee may decide, due regard being had to relative advantages of position, etc.
3.	Two stationary forces of INFANTRY in the open, and firing at each other at known ranges. Which MAINTAINS position?	Even.	....
4.	SKIRMISHERS versus ARTILLERY (two companies, 1 in support: 1 Battery), both "in the open." Is a further advance possible? 500 to 350 yards. 350 "	Even. 3:2	SKIRMISHERS.	This question does not arise until skirmishers have lost at least 10 per cent. of strength. The die must thereafter be consulted at each specified distance. If it favors an advance, it may be continued with a view to attempting the capture of the battery (Case 21, Table S), or the skirmishers may lie down and open <i>Heavy fire</i> upon the battery (Case 15, Table L). If the advance is checked, the skirmishers may renew the attempt at 3, 6, 12, etc., minute intervals, lying down in the mean time, and continuing to harass the battery (Cases 14, 15, Table L), Cases 8 and 9, this Table.
5.	Same, CHECKED IN THEIR ADVANCE, lying down and firing at battery. WHICH MUST RETIRE? 500 yards. 350 "	2:1 5:1	SKIRMISHERS. "	Skirmishers may advance up to 500 yards from a battery, and until they suffer 10 per cent. loss, without consulting this table, and may continue such advance so long as they obtain good cover. (See Case 21, Table S.)
6.	Half a Regiment of INFANTRY IN LINE, advancing to the attack of a BATTERY, both "in the open." Can a further advance be made? 800 to 500 yards. 500 to 300 " 300 to 200 " 200 " (See Case 22, Table S.)	2:1 3:2 Even. "	INFANTRY. "	After the losses have reached 20 per cent. of strength, the die must be thrown at each distance. If infantry is successful, it may continue the advance, or halt and open <i>Heavy fire</i> upon the battery, which (Cases 15, 19, Table L) must retire. If the decision is adverse to infantry in line or column, it must retire to a distance of 1,500 yards from the battery, or until it can find cover (a <i>second line of battle</i> , etc., may in cases of deliberate attacks constitute such cover. (Case 8, this Table.)
7.	1 Regiment of INFANTRY, in column of attack, charging a BATTERY, both "in the open." Is a further advance possible? 800 to 650 yards. 650 to 400 " 400 to 200 " 200 "	Even. 3:2 2:1 3:1	ARTILLERY. " "	Infantry in line or column may advance up to 800 yards from a battery, and until its losses exceed 20 per cent., without reference to this table, and may continue such advance if afforded proper cover. It frequently may dart from cover to cover across dangerous spaces (Case 7, Table S. See also note to Case 6 above, and Case 20, Table L).
8.	INFANTRY lying down, or under cover, and firing, or Skirmishers checked in their advance, lying down, and firing, on a BATTERY "in the open"; can the latter maintain position in spite of losses? (§ 314.) 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	Even. 3:2 3-2:1 6-4:1	INFANTRY. " "	The losses must be calculated independently, and the die thrown at proper intervals (Cases 14, 15, 21, Table L, and Notes to Cases 22 and 23, Table S).
9.	INFANTRY fire having proved too hot for ARTILLERY, "in action" (Cases 5 and 8, present Table; also Cases 14, 15, 19, 21, Table L); can the guns be limbered up, and drawn off in the face of it? 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	Even. 3:2 2:1 4:1	INFANTRY. " "	If the range be incorrectly estimated by the Infantry, artillery may move into, out of, or maintain position, in spite of its fire, so long as its losses (men and horses [§ 314], as the case may be) do not render the attempt impracticable.
10.	ARTILLERY versus INFANTRY, latter firing at known range. May the guns move up into action? 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	Even. 2:1 4:1 6:1	INFANTRY. " "	The losses of the artillery while making the attempt will govern the case (§ 314). After these become serious, the question of possibility comes up. At ranges greater than 1,500 yards this case will not need consultation, save on exceptional occasions. At less ranges than 300 yards the attempt can not be allowed (Cases 14, 15, 19, and 21, Table L).

TABLE I.—OF POSSIBILITY (*Continued*).

CASE.	CIRCUMSTANCES, QUESTIONS, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
11.	May GUNS come into action in the presence of ARTILLERY already in action and posted at 1,200 to 1,000 yards? 1,000 to 800 " 800 to 650 " 650 to 500 " 500 to 400 " 400 to 300 " (See Cases 17 and 18, Table L.)	Even. 3 : 2 2 : 1 3 : 1 4 : 1 5 : 1	ARTILLERY ALREADY IN ACTION. " "	This question will not come up till the losses of artillery (§ 314), attempting to come into action, are such as to render the success impracticable. If the range has not been accurately estimated by artillery in action, guns may move up without reference to this table, as they may also do at ranges greater than 1,200 yards. But they are never to move up "in the open," in the presence of artillery already in action and posted at less than 300 yards. (See Cases 12, 13, and 14, below.)
12.	ARTILLERY in combat with hostile ARTILLERY, range known to both: which force must retire?	Even.	....	(See Cases 17 and 18, Table L, and Cases 11 and 13, this Table.) To relative losses will influence the case (§ 314).
13.	Can BEATEN ARTILLERY (which, in spite of losses, and one decision that it must retire) remain in action in the PRESENCE of HOSTILE ARTILLERY?	2 : 1	SUCCESSFUL ARTILLERY.	The dice must be consulted a <i>second</i> time 2 to 15 minutes after the first adverse decision (Cases 11, 12, 14, present Table), and, if again unfavorable, the beaten artillery <i>must cease firing</i> and retire (Case 19, Table L), and may not return into action for a period varying from 30 minutes to an hour, according to its losses.
14.	ARTILLERY finally forced to retire before ARTILLERY: may the guns be limbered up, or must they be abandoned? 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	Even. 2 : 1 3 : 1 5 : 1	SUCCESSFUL ARTILLERY. "	(See note to Cases 12 and 13, above, also consult Case 14, Table L.)
15.	ARTILLERY FIRE UNANSWERED, if heavy, may a bridge be constructed under it?	2 : 1	ARTILLERY.	Regard must be had to the percentage of losses inflicted, which, if greater than 10 per cent., will call for a consultation of this case, every adverse decision stopping the work for periods varying from 5 to 20 minutes, according to percentage of losses.
16.	CAVALRY versus OBSTACLES (bridge, ditch, sunken road, etc.), held by SKIRMISHERS, ground in front not being open for 800 yards, can the former surmount them?	3 : 1	SKIRMISHERS.	Such obstacles are generally insurmountable for cavalry, if they are held by skirmishers who have open ground in front for 800 yards or more. Cavalry will be <i>delayed</i> under fire a due portion of time; 10 per cent. of losses will bring the question up. The Referee must decide according to circumstances whether cavalry can <i>force</i> a passage over a bridge, in the face of a body of troops in line or column, posted on opposite side.
17.	May CAVALRY remain in position in the presence of SKIRMISHERS at 1,500 to 1,200 yards? 1,200 to 800 " 800 to 500 "	Even. 2 : 1 5 : 1	SKIRMISHERS. "	Can do so until losses exceed 10 per cent. If the range is incorrectly estimated by the infantry, cavalry can generally maintain position; but it is not considered possible at a less distance than 500 yards. (See Case 13, Table L.)
18.	May a body of CAVALRY gallop by INFANTRY, posted at 800 to 500 yards? Same at a trot, " " Same at a gallop, 500 to 300 " Same at a trot, " "	Even. 2 : 1 3 : 1 5 : 1	INFANTRY. " "	Question will come up so soon as cavalry losses exceed 10 per cent. Cavalry may ride by infantry posted at greater distances than 800 yards, and by guns in action at greater than 600 yards (Referee). It can not ride by either at a <i>walk</i> within these distances. Cavalry may not ride by infantry, or artillery posted within 300 yards, except when in pursuit, and then only by special permission of the Referee.
19.	May a body of CAVALRY gallop by HOSTILE GUNS, posted at 600 to 300 yards? Same at a trot, " "	2 : 1 5 : 1	ARTILLERY. "	
20.	PASSAGE OF FORDS, opposed by SKIRMISHERS and small detachments in good position. Same, if SUPPORTED in good style from hither side of the stream.	2 : 1 Even.	DEFENSIVE.	Losses to exceed 20 per cent. before the question comes up. Where no opposition is offered, the passage will depend upon nature of ford. (See Cases 9, 10, 11, Table H.) When the passage is contested under ordinary circumstances, the question may recur at increasing intervals of from 5 to 20 minutes. If a successful passage is made in the face of opposition, the troops will reach the opposite bank, suffering more or less in organization (See Case 6, Table S.)
21.	Same if hotly contested upon opposite bank by hostile ARTILLERY, or INFANTRY, or BOTH, unanswered. Same if both the attempt and opposition be well ordered and assisted by Infantry and Artillery.	4,5 or 6:1 2 : 1	DEFENSIVE. "	In the face of extraordinary opposition but three several attempts will be allowed at intervals of 5, 15, and 30 minutes respectively, relative losses upon each side having due weight (Case 6, Table S.)
22.	Passage of rivers, ponds, etc., on the ICE, opposed by Skirmishers and Infantry in general, well posted. Same if attempt be well supported from hither side by Infantry.	3 : 2 Even.	"	Losses must exceed 20 per cent. before the success of the attempt becomes doubtful. Ice should be strong in proportion to the magnitude of the force crossing (see Cases 12 and 13, Table II). So long as the ice remains firm successive attempts may be made at increasing intervals according to circumstances.

TABLE I.—OF POSSIBILITY (*Continued*).







CASE.	CIRCUMSTANCES, QUESTIONS, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
23.	Same, hotly contested by ARTILLERY.	3-36 : 1	ARTILLERY.	Where, however, <i>artillery</i> can play upon and break the ice, the attempt becomes more hazardous and defeat is far more disastrous, repetitions of the attempt being generally impracticable.
24.	A force of "all arms" attempting to debouch from a DEFILE in the presence of hostile Infantry posted at 1,500 to 1,200 yards? Same at 1,200 to 800 " " at 800 to 500 " " at 500 to 300 " " at less than 300 "	Even. 2 : 1 3 : 1 5 : 1 Referee.	DEFENSIVE. " " "	10 per cent. loss of strength of numbers debouching in a given time will render the consultation of this case necessary. In cases such as the opposite (24 and 25), the volume and nature of the fire and the degree of preparation to resist, etc., have much to do; so also will the degree of preparatory fire resorted to by the debouching party, and his previous dispositions, greatly affect the possibilities of exit.
25.	Same if in the presence of hostile Artillery, range known, posted at 600 yards or less? Same at 600 to 800 yards? Artillery debouching 600 to 800 yards? Cavalry " " " Infantry " " " Force of "all arms" " 800 to 1,200 yards? Artillery " " " Cavalry " " " Infantry " " " Force of "all arms" " 1,200 to 1,600 yards? Artillery " " " Cavalry " " " Infantry " " " Force of "all arms" " 1,600 to 2,000 yards? Artillery and Cavalry " " "	Referee. 6 : 1 5 : 1 4 : 1 3 : 1 4 : 1 3 : 1 2 : 1 3 : 2 3 : 1 2 : 1 3 : 2 Even. 3 : 2 Even.	DEFENSIVE. " " " " " " " " " " " " DEFENSIVE. Even.	Governed by losses, as above. Where cavalry and artillery, unsupported by infantry, attempt to debouch in the face of hostile <i>cavalry</i> , posted at within 500 yards of the mouth of the defile, the adverse ratio will generally be high. If the latter be posted beyond 500 yards, the ratio will be from 4 to 1 : 1, according to circumstances (Referee).
26.	A battery having fired for the space of 5 minutes at wooden buildings, has it been possible to SET THEM ON FIRE?	Even.		When fewer guns are employed the time must be proportionately increased, or the ratio diminished adversely to the artillery; conversely, when the time is increased the term of the ratio pertaining to the battery will be increased by 1 for every additional period of 3 minutes. The die may be consulted as often as desired.
27.	The fire having taken and 5 minutes having elapsed, has it SPREAD?	2 : 1	ARTILLERY.	If no attempt has been made to stay the flames it will be regarded as having spread. The fire of the battery should be continued to insure spreading. For every successive consultation at periods of 5 minutes the term in favor of the spread of the flames will be increased by unity.
28.	The flames having been spreading 5 minutes, can they be EXTINGUISHED?	3 : 1	ARTILLERY.	If no attempt is made to prevent their further spread, or the attempt at extinguishing fails, the buildings, etc., must be abandoned, and troops may not march among them. If the attempt favors the extinguishment, it may be effected in due time, and artillery must repeat the entire process. When houses are of brick, stone, etc., the periods for the successive consultations of the die must be doubled, or the adverse chances increased.
29.	The fire of ARTILLERY having continued from 5 to 15 minutes upon bridges, barricades, lee, etc., has their destruction been effected?	From even to 5 : 1	ARTILLERY.	One battery considered, the time will vary with the character of the object. If the guns lose, the die may be reconsulted in 1 to 5 minutes, and, failing three times in succession, the destruction of the object can not be effected for half an hour, after which the same process must be repeated. The Referee should always make an original decision as to whether the desired destruction can or can not be effected by artillery fire, and state the time, number of guns, etc., necessary. Where the object is invisible, but its position and distance are known, the above rule applies, save that two successive failures by artillery will delay the destruction 20 minutes, after which, if the fire be continued, the dice may be reconsulted, and so on for each additional failure thereafter. In cases where artillery should not be informed of its success or failure, the Referee will consult the die himself.
30.	MORALE.—Other things being equal and troops having lost $\frac{1}{10}$ of their strength, is it possible for them to continue in their intention? Same $\frac{1}{10}$ strength lost? " $\frac{1}{4}$ " " $\frac{1}{2}$ " " $\frac{3}{4}$ " " $\frac{1}{2}$ " " $\frac{3}{4}$ "	2 : 1 3 : 2 Even. 3 : 2 2 : 1 3 : 1 5 : 1	IN THEIR FAVOR. AGAINST THE TROOPS IN-CURRING LOSS.	Time supposed is up to moments of each successive fractional loss, at each of which moments the dice may be consulted. Of course, when losses affect both sides concerned, each may introduce its appropriate ratio, and thus perhaps neutralize the result. The <i>rate</i> of loss will have considerable effect in demoralizing attacks. However, the natural impulse and enthusiasm of a charge, or desperate venture, should allow of considerable modification of these ratios (see Appendix F, Section viii, Note A, ¶¶ p, q, and r).
31.	Cavalry shelled with "ordinary effect" for 2 minutes, has it become shaken? Same "shaken" and shelled for 2 minutes, has it become "much shaken"? Same "much shaken" and shelled for 1 minute, is it in disorder? Same in disorder and shelled for 1 minute, is it in "great confusion"?	Even. 2 : 1 3 : 1 5 : 1	FIRING PARTY. " "	In all such considerations of <i>morale</i> the dice must be consulted to determine the question under due ratios. If the result is favorable to <i>demoralization</i> , the consequence will be an adverse ratio, duly marked upon the piece, and in value depending upon the degree of demoralization (see Case 6, Table S).

TABLE I.—OF POSSIBILITY (*Continued*).

CASE.	CIRCUMSTANCES, QUESTIONS, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
32.	Troops in woods, position generally known, and shelled with "ordinary effect" 15 minutes, are they "shaken"? Same 5 to 10 minutes longer, are they "badly shaken"?	Even. 3 : 2	FIRING PARTY.	Troops thus demoralized to the degree of <i>great confusion</i> must evacuate the woods, and be <i>marked</i> to show condition a suitable length of time.
33.	Moral effect upon troops shelled and not able to reply. Fire continued 10 minutes?	3 : 2	"	Die will be consulted at 10 minute intervals, and each adverse decision will increase the term of the ratio opposite and of the consequent <i>mark</i> by unity. Loss incurred will, however, influence the case, as well as volume of fire to which they are exposed.
31.	Troops "cut off," trapped by surprise, etc., are they "shaken"?	3 : 1	ASSAILANT.	Consequence continues until communication is regained.
35.	A well-directed and sudden volley, delivered at short range from troops under "cover," etc., has it demoralized the party exposed?	5 : 1	FIRING PARTY.	If loss thereby incurred equals $\frac{1}{3}$ of previous strength the question may arise, and, if decided in favor of <i>demoralization</i> , the party must retreat in <i>disorder</i> to cover, or a safe distance.
36.	Troops whose ammunition is exhausted, will they maintain position, etc.?	2 : 1	AGAINST.	If decision is adverse, and ammunition is not obtained in 5 minutes, they must retire to cover, chances 6 : 1 (—) until resupplied.

TABLE J.

FOR DECIDING POSSIBILITY OF ATTACK, MAINTENANCE OF POSITION, AND OTHER KINDRED QUESTIONS, BY AN APPEAL TO A SINGLE DIE.

RATIOS.	FACE OF THE DIE.						CHANCES GAINED FOR ONE AND LOST FOR THE OTHER.
							
Even.	Red.	Blue.	Red.	Blue.	Red.	Blue.	None.
3 : 2	3	3	3	2	2	0	3 in 5
2 : 1	2	2	2	2	1	1	2 in 3
3 : 1	3	3	3	1	0	0	3 in 4
4 : 1	4	4	4	4	1	0	4 in 5
5 : 1	5	5	5	5	5	1	5 in 6

RULE V. Throw the die once. The square opposite the ratio under consideration, and in the vertical column headed by the face of the die which turns up, indicates the winning side. Should this square contain a 0 there is no decision, and the table must be reconsulted.

TABLE K.

FOR DECIDING HIGHER RATIOS OF POSSIBILITY, ETC., THAN 3 : 1, BY AN APPEAL TO 2 OR 3 DICE, AS THE CASE MAY BE.

(Original.)

CASE.	RATIO.	Chances of Adverse Party.	Chances Gained or Lost.	No. of Dice to use.	Combination of Spots to be sought.
1	5 : 1	1 in 6	4	2	7
2	6 : 1	1 in 7	5±	2	6
3	7 : 1	1 in 8	6±	3	7 or 14
4	8 : 1	1 in 9	7	2	5
5	9 : 1	1 in 10	8±	3	8
6	10 : 1	1 in 11	9±	3	6 or 15
7	11 : 1	1 in 12	10	2	4
8	14 : 1	1 in 15	13±	3	7
9	17 : 1	1 in 18	16	2	3
10	21 : 1	1 in 22	20±	3	6
11	35 : 1	1 in 36	34	2	2
12	71 : 1	1 in 72	70	3	4
13	215 : 1	1 in 216	214	3	3

RULE VI. Consult the dice *once*, throwing with the number called for opposite the ratio under consideration at the time. If the corresponding combination of spots results, the party to whom the ratio is *adverse wins*; otherwise, he loses.

TABLE L.—OF DURATION.

MAINTENANCE OF POSITION UNDER FIRE, CONTINUANCE OF CONDITION, MORALE, ETC.

(Foreign Tables altered, enlarged, and brought down to date.)

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	QUESTION.	DURATION, INTERVAL, Etc.	REMARKS, REFERENCES, Etc.
1.	Troops with ENTHUSIASM AT THE HIGHEST PITCH (see Table T; also Case 6, Table S).	Continue so ?	?	Referee decides, after which, n. c.,* they are regarded as <i>flushed with victory</i> .
2.	Troops FLUSHED WITH VICTORY (see Table T; also Case 6, Table S).	"	?	Referee decides, after which, n. c., they are to be regarded as <i>fresh</i> .
3.	FRESH TROOPS after entering action (see Case 2, Table S).	"	10 to 30 mins.	After which, n. c., they become <i>not fresh</i> . Troops continue <i>fresh</i> , n. c., so long as they remain out of action, or become so after leaving it for half an hour. Adverse circumstances, such as arduous labor, forced marches, etc., incident to campaigning, may reduce troops to a <i>not fresh</i> condition.
4.	Troops that are NOT FRESH (see Case 2, Table S).	"	?	n. c., so long as they continue in action, and until suitably rested after leaving it, etc. (Referee).
5.	Troops SOMEWHAT SHAKEN , Tables S and T.	"	1 to 5 mins.	After which, n. c., they become <i>not fresh</i> . (Case 2, Table S.)
6.	" SHAKEN , " "	"	5 minutes.	" " " <i>somewhat shaken</i> . (Case 6, Table S.)
7.	" BADLY SHAKEN , " "	"	10 to 20 mins.	" " " <i>shaken</i> . " "
8.	" IN DISORDER , " "	"	20 to 30 "	" " " <i>badly shaken</i> . " "
9.	" IN GREAT CONFUSION , " "	"	30 to 60 "	" " " <i>in disorder</i> . " "
10.	" ROUTED , " "	"	?	Referee decides; also their condition after the rally.
11.	" TOTALLY ROUTED , " "	"	?	" " " " " "
12.	The Melée , hand-to-hand conflict, FINAL RUSH , etc., having commenced	When shall it terminate ?	In at least 5 minutes.	Referee will decide in exceptional cases. (See note at heading of Table S; also Order of Procedure, Table A.)
13.	CAVALRY exposed to the fire of SKIRMISHERS at 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 "	How long can it maintain position ?	5 minutes. 2 " 1 "	The die having been originally consulted (Case 17, Table I) must be reconsulted at each expiration of the proper interval, <i>Skirmishers adding unity</i> to their term of the ratio at each consultation. Cavalry to lose 10 per cent. of strength before question comes up.
14.	SKIRMISHERS checked in their advance, lying down, and firing on a BATTERY , both in the open at 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	How long can the battery maintain position ?	5 to 10 mins. 3 to 5 " 1 to 3 " 0 to 1 "	The Battery having lost 20 per cent. of strength (Cannoneers), this question comes up. The die (Case 5, Table I) must be consulted at each expiration of the proper interval, Skirmishers increasing their term of the ratio by unity at each successive consultation.
15.	SKIRMISHERS or INFANTRY firing with Heavy effect on Infantry, lying down; and firing, or under cover and firing at known ranges upon ARTILLERY in action, at 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 "	How long can the battery maintain position ?	5 minutes. 2 " 1 "	The Battery having lost 20 per cent. of strength, the question comes up. Consult the die (Cases 4, 5, 6, 8, 9, Table I), at each expiration of the proper interval, Skirmishers, etc., adding unity to their term of the ratio at each successive reconsultation, and at each increment of 10 per cent. to the battery's losses. The Referee for similar reasons may sometimes find it necessary to make the tenure of position doubtful to the <i>Skirmishers</i> or <i>Infantry</i> .
16.	Two stationary forces of INFANTRY , exposed to each other's fire, in the open at 1,500 to 1,200 yards. 1,200 to 800 " 800 to 500 " 500 to 300 "	How long before one or the other shall retire ?	5 to 10 mins. 3 to 5 " 1 to 3 " 0 to 1 "	The losses of either must equal 20 per cent. before its power to maintain position becomes doubtful. Consult the die (Case 3, Table I) at the expiration of the proper interval, increasing the adverse chances of maintenance by unity for each successive reconsultation, and for each increment of 10 per cent. to losses. If the range is unknown to one or both sides, or if both are under cover, etc., the Referee decides upon the proper interval to be employed, as well as when the first application to Table I will be made.
17.	ARTILLERY in combat with ARTILLERY , range known, at 2,000 to 1,200 yards. 1,200 to 800 " 800 to 600 " 600 to 300 "	When must one or the other retire or cease firing ?	10 to 20 mins. 5 to 10 " 2 to 5 " 0 to 2 "	Battery should be reduced to minimum effective strength before question of maintenance comes up (§ 314). Rate of losses will affect interval. Consult Case 12, Table I, at the expiration of the proper interval, increasing adverse chances at each successive reconsultation, and at each reduction of efficiency. When the range is incorrectly estimated by one or both sides, Referee will alter interval, etc.
18.	INFANTRY forced to retire before INFANTRY (Case 16, above), and ARTILLERY from before ARTILLERY (Case 17, above), etc.	May return into action, how soon ?	In 5, 10, 30, etc., mins.	Referee decides according to losses incurred, circumstances of case, etc. (Cases 3 and 12, Table I.)

* n. c. = nothing to the contrary.

TABLE L.—OF DURATION (*Continued*).

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	QUESTION.	DURATION. INTERVAL, Etc.	REMARKS, REFERENCES, Etc.
19.	INFANTRY in Line attacking ARTILLERY (Cases 6 and 7, Table I), and which has been checked in its advance, or forced to retire before coming to a hand-to-hand conflict, final rush, etc.; and ARTILLERY which has been forced to retire before INFANTRY (Cases 8, 9, 10, Table I).	How long before it may return into action, or resume the offensive?	In from 10 or 30 minutes to —	Referee decides according to losses incurred. (See Notes on Cases 14 to 18, this Table.)
20.	INFANTRY in Column attacking ARTILLERY (Case 7, Table I), and which is forced to give up the attempt before making the final rush.	When may it be brought again into action?	Not till at least 30 minutes have expired.	Referee decides according to losses, obstinacy of the attack, defense, etc. Or one of the Cases 5 to 11 of this Table may be considered as applying, and a corresponding condition (Case 6, Table S) assigned to the repulsed party.
21.	INFANTRY firing, but not under cover, at ARTILLERY in action, and vice versa. Range 1,500 to 1,200 yards. " 1,200 to 800 " " 800 to 500 " " 500 to 300 "	How long before one or the other must retire?	10 to 5 mins. 5 to 3 " 3 to 1 " 1 to 0 "	Losses govern the case (20 per cent. for Infantry, and reduction to minimum effective strength for Artillery being necessary to bring the question up, etc.). Consult the die (Case 8, Table I) at the expiration of the proper intervals; consult also Cases 14, 15, and 16, this Table.
22.	DEFEATED CAVALRY must retreat at a gallop, remain hors de combat, etc.	How long?	Referee.	Consult Notes to Cases 6, 9, 14, 15, 16, Table S; see also Table I in general, etc.
23.	PREPARATORY FIRE upon villages, woods, defiles, strong defensive positions, etc., must continue.	How long?	Referee.	Consult Notes on Cases 24 and 25, Table S; see also Appendix F, Section viii, Note B, ¶ 4.

TABLE M.—OF CASUALTY.

LOSSES PER MINUTE, OCCASIONED BY **INFANTRY FIRE**. [100 MEN IN THIN SKIRMISH ORDER FIRING AGAINST A STATIONARY "LINE OF BATTLE."]

(Original.)

RANGES.		UNCERTAIN EFFECT.																							
		GOOD EFFECT.												POOR EFFECT.											
		DEADLY FIRE.						HEAVY FIRE.						ORDINARY FIRE.						INEFFECTUAL FIRE.					
		Yards.																							
Under 100	300	274	243	221	195	169	143	129	115	101	87	74	60	53	45	38	30	23	15	11	7	3	0	0	
100 to 200	315	288	260	233	205	177	150	135	120	105	91	77	63	55	47	39	31	24	16	12	8	4	0	0	
200 to 300	308	281	254	227	200	173	146	132	118	104	89	75	62	54	46	39	31	23	15	11	7	3	0	0	
300 to 400	291	266	240	215	189	164	138	125	112	98	84	71	58	52	44	37	29	22	15	10	6	2	0	0	
400 to 500	266	242	219	196	173	149	126	114	102	89	77	65	53	46	40	33	27	20	13	9	5	2	0	0	
500 to 600	249	226	206	184	162	140	118	107	96	84	73	61	50	44	37	31	25	19	12	9	5	2	0	0	
600 to 700	226	206	187	167	147	127	107	97	87	76	66	56	45	39	34	28	23	17	11	8	4	2	0	0	
700 to 800	200	183	165	148	130	113	95	86	77	67	58	49	40	35	30	25	20	15	10	7	4	2	0	0	
800 to 900	181	165	149	133	117	102	88	77	69	61	52	43	36	32	27	23	18	14	9	6	3	1	0	0	
900 to 1000	157	143	129	116	101	88	74	67	60	53	45	38	31	27	23	20	16	12	8	5	2	1	0	0	
1000 to 1200	122	112	101	90	79	68	58	52	47	41	36	30	24	21	18	15	12	9	6	4	1	1	0	0	
1200 to 1600	44	40	36	32	28	24	21	18	16	14	12	10	9	8	7	5	4	3	2	1	1	0	0	0	
1600 to 2000	28	25	23	20	18	15	13	12	11	9	8	7	6	5	4	3	3	2	1	1	1	0	0	0	
2000 to 2500	7	6	6	5	5	4	4	3	3	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	
2500 to 3000	3	3	3	2	2	1.8	1.5	1.3	1.1	.9	.8	.7	.6	.5	.4	.3	.2	.1	.1	0	0	0	0	0	
3000 to 4000	.2	.15	.15	.15	.1	.1	.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

NOTE 1. For a full explanation of the method of consulting this and similar Tables of Casualty see ¶ 292, 298, etc.

" 2. This table is founded upon the data contained in Table "a," Appendix F, its best effect under *Deadly fire* being derived from that deduced for *Battle effect* in the latter, q. v.

" 3. 100 men in Line of Battle, i. e., two ranks at 22" to the man, firing against a similar line, front for front, is taken as the *Tabular Unit*. When, therefore, less number fire, a corresponding proportionate amount of the tabular effect will be taken—for instance, $\frac{1}{10}$ for a squad of 10 men, $\frac{1}{4}$ for 25 men, etc.

" 4. *Ceteris paribus*, the effect alters very materially both with the formation in which, and with that against which, troops fire. When, therefore, the table does not apply directly, the Referee may assist his judgment by referring to the Table of Multipliers (R), Rule VII. See also ¶ 310, et seq.

TABLE N.—OF CASUALTY.

LOSSES PER MINUTE, OCCASIONED BY THE FIRE OF ONE BATTERY OF [6] **GATLING GUNS** [CAL. 45], AT 20 YARDS INTERVAL, AGAINST AN INFANTRY "LINE OF BATTLE." [STATIONARY.]

(Original.)

RANGES.	UNCERTAIN EFFECT.																							
	GOOD EFFECT.												POOR EFFECT.											
	DEADLY FIRE.						HEAVY FIRE.						ORDINARY FIRE.						INEFFECTUAL FIRE.					
Yards																								
Within 100	x	x	x	x	x	x	x	x	x	x	x	x	205	201	172	143	114	85	57	41	27	13	0	0
100 to 200	x	x	x	x	x	x	x	433	414	364	315	265	216	189	162	135	108	81	54	40	26	12	0	0
200 to 300	x	x	x	x	x	502	468	422	377	332	287	242	197	172	147	123	98	73	49	36	23	11	0	0
300 to 400	x	x	x	x	571	495	419	378	338	297	257	216	176	154	132	110	88	66	44	33	21	10	0	0
400 to 500	x	x	640	597	536	455	344	347	310	273	236	199	162	142	121	101	81	60	40	29	19	9	0	0
500 to 600	709	674	609	544	479	414	350	316	282	248	214	180	147	128	110	91	73	54	36	26	17	8	0	0
600 to 700	663	605	546	488	430	372	314	283	253	223	192	162	132	116	99	82	66	49	33	24	15	7	0	0
700 to 800	590	538	486	435	383	331	280	253	226	199	172	145	118	103	89	74	59	44	29	21	13	6	0	0
800 to 900	531	475	429	384	338	292	247	223	199	175	151	127	104	91	78	65	52	39	26	18	11	5	0	0
900 to 1000	450	410	371	331	292	252	213	192	172	151	131	110	90	79	67	56	45	33	22	16	10	4	0	0
1000 to 1200	411	375	339	303	267	231	195	176	157	138	119	100	82	72	61	51	41	30	20	12	7	4	0	0
1200 to 1600	343	312	282	252	222	192	162	146	130	115	99	83	68	59	51	42	34	25	17	10	5	3	0	0
1600 to 2000	259	236	213	190	167	144	122	110	98	86	74	62	51	44	38	31	25	18	12	9	4	2	0	0
2000 to 2500	157	143	129	115	101	87	74	67	59	52	45	38	31	27	23	19	15	11	7	5	3	1	0	0
2500 to 3000	102	93	84	75	66	57	48	43	38	34	29	24	20	17	15	12	10	7	5	3	1	0	0	0
3000 to 4000	56	51	46	41	36	31	27	24	22	19	16	13	11	9	8	6	5	3	2	1	0	0	0	0
Over 4000	6	5	5	4	4	3	3	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0

- NOTE 1. To employ the table, see ¶ 298. See also ¶ 292, *et seq.*
 " 2. For a consideration of the data upon which this table is founded, consult Table "b," Appendix F, and its accompanying notes.
 " 3. When the table does not apply directly, the Referee may assist his judgment by referring to the Table of Multipliers (R), Rule VII. See also ¶ 310, *et seq.* ; see also Notes on Table "a" of Casualties due to Infantry fire, Appendix F.

TABLE O.—OF CASUALTY.

LOSSES PER MINUTE, OCCASIONED BY THE FIRE OF ONE BATTERY OF [6] 12-PDRS.
AGAINST AN INFANTRY "LINE OF BATTLE."

(Original.)

PROJECTILE.	RANGES.	UNCERTAIN EFFECT.																							
		GOOD EFFECT.												POOR EFFECT.											
		DEADLY FIRE.						HEAVY FIRE.						ORDINARY FIRE.						INEFFECTUAL FIRE.					
		Yards.																							
SINGLE CANISTER.	Within 200	180	164	148	133	117	101	86	77	69	61	52	44	36	31	27	22	18	18	9	7	4	2	0	0
	Within 200	125	114	103	92	81	70	59	53	47	42	36	30	25	21	18	15	12	9	6	4	2	1	0	0
	200 to 300	96	87	79	71	62	54	46	41	37	32	28	23	19	16	14	11	9	6	4	3	2	1	0	0
	300 to 400	36	33	30	27	23	20	17	15	13	12	10	8	7	6	5	4	3	2	1	1	0	0	0	0
	400 to 600	5	4	4	3	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Up to 300	77	70	63	57	50	43	37	33	29	26	22	18	15	13	11	9	7	5	3	2	1	0	0	0
	300 to 500	120	109	99	88	78	67	57	51	46	40	35	29	24	21	18	15	12	9	6	4	2	1	0	0
CASE SHOT.	500 to 800	176	160	145	130	114	99	84	75	67	59	51	43	35	30	26	21	17	12	8	5	3	1	0	0
	800 to 1000	208	190	172	154	136	118	101	91	81	78	61	51	41	35	30	25	20	15	10	7	4	2	0	0
	1000 to 1200	192	175	153	141	124	107	90	81	71	63	55	46	38	33	28	23	18	13	9	6	3	1	0	0
	1200 to 1600	96	87	79	71	62	54	46	41	37	32	28	23	19	16	14	11	9	6	4	3	2	1	0	0
	1600 to 2000	52	47	43	38	34	29	25	22	20	17	15	12	10	8	6	5	4	3	2	1	1	0	0	0
	2000 to 2500	6	5	5	4	4	3	3	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Within 300	12	11	9	8	7	6	5	4	4	3	3	2	2	2	1	1	0	0	0	0	0	0	0	0
TIME SHELL.	300 to 500	20	18	16	15	13	11	10	9	8	7	6	5	4	3	2	2	1	1	1	0	0	0	0	0
	500 to 800	28	25	22	20	18	15	13	12	11	11	10	9	9	7	5	4	3	2	1	1	0	0	0	0
	800 to 1200	31	28	25	22	19	16	14	12	11	10	8	7	6	5	4	3	2	1	1	1	1	0	0	0
	1200 to 1400	20	18	16	15	13	11	10	9	8	7	6	5	4	3	2	2	1	1	1	0	0	0	0	0
	1400 to 1600	9	8	7	6	5	4	4	3	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0
	1600 to 2000	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE 1. To employ the table, see ¶ 298. See also ¶ 292, *et seq.*

" 2. For a consideration of the *data* upon which this table is founded, consult Table "c," Appendix F, and its accompanying notes.

" 3. When the table does not apply directly, the Referee may assist his judgment by referring to the Table of Multipliers (R), Rule VII. See ¶ 310, *et seq.*

TABLE P.—OF CASUALTY.

LOSSES PER MINUTE, OCCASIONED BY THE FIRE OF ONE BATTERY OF [8] 3"-RIFLES
AGAINST AN INFANTRY "LINE OF BATTLE."

(Original.)

PROJECTILE.		UNCERTAIN EFFECT.																							
		GOOD EFFECT.												POOR EFFECT.											
		DEADLY FIRE.						HEAVY FIRE.						ORDINARY FIRE.						INEFFECTUAL FIRE.					
		Yards.																							
SINGLE CANISTER.	Within 200	240	219	198	178	151	136	116	104	93	82	70	59	48	42	36	30	24	18	12	9	6	3	0	0
	Within 200	216	197	178	159	140	121	102	92	82	72	62	52	43	37	32	26	21	15	10	7	4	2	0	0
	200 to 300	175	159	144	129	113	98	83	75	67	59	51	43	35	30	26	21	17	12	8	5	3	1	0	0
	300 to 400	68	62	56	50	44	38	32	27	24	21	19	16	13	11	9	7	5	4	3	1	0	0	0	0
	400 to 600	10	9	8	7	6	5	5	4	4	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0
	Up to 300	54	49	44	40	35	30	26	23	20	18	15	12	10	8	6	5	4	3	2	1	0	0	0	0
	300 to 500	93	85	77	69	61	53	45	40	36	31	27	22	18	15	13	11	8	6	4	2	0	0	0	0
	500 to 800	131	119	108	97	85	74	63	56	50	44	38	32	26	22	19	16	12	9	6	4	2	1	0	0
	800 to 1200	151	138	125	112	99	86	73	65	58	51	44	37	30	26	22	18	14	10	7	5	3	1	0	0
	1200 to 1600	131	109	108	97	85	74	63	56	50	44	38	32	26	23	19	16	12	9	6	4	2	1	0	0
1600 to 2000	78	71	64	57	50	43	37	33	29	26	22	18	15	13	11	9	7	5	3	1	0	0	0	0	
2000 to 3000	30	27	24	22	19	16	14	12	11	10	8	7	6	5	4	3	2	1	1	0	0	0	0	0	
3000 to 4000	6	5	5	4	4	3	3	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
4000 to 5000	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Over 5000	•5	•4	•3	•2	•1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PERCUSSION SHELL.	Within 300	16	14	13	12	10	9	8	7	6	5	4	3	3	2	2	1	1	0	0	0	0	0	0	0
	300 to 500	21	19	17	15	13	11	10	9	8	7	6	5	4	3	2	2	1	1	1	0	0	0	0	0
	500 to 800	26	23	21	19	16	14	12	10	9	8	7	6	5	4	3	2	2	1	1	1	0	0	0	0
	800 to 1200	23	20	18	16	14	12	10	9	8	7	6	5	4	3	2	2	1	1	1	0	0	0	0	0
	1200 to 1600	18	16	14	13	11	9	8	7	6	5	4	3	3	3	2	2	1	1	1	0	0	0	0	0
	1600 to 2000	14	12	11	10	8	7	6	5	4	4	3	2	2	2	1	1	0	0	0	0	0	0	0	0
	2000 to 3000	8	7	6	6	5	4	4	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	3000 to 4000	3	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4000 to 5000	•75	•6	•4	•3	•15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Over 5000	•16	•10	•05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

NOTE 1. To employ the table, see ¶ 298. See also ¶ 292, *et seq.*

" 2. For a consideration of the *data* upon which this table is founded, consult Table "d," Appendix F, and its accompanying notes.

" 3. When the table does not apply directly, the Referee may assist his judgment by referring to the Table of Multipliers (R), Rule VII. See ¶ 310, *et seq.*

TABLE Q.—OF CASUALTY.

LOSSES PER MINUTE, OCCASIONED BY THE FIRE OF ONE BATTERY OF [6] **HOTCHKISS REVOLVING CANNON** [CAL. 1½"], AT 30 YARDS INTERVAL, AGAINST AN INFANTRY "LINE OF BATTLE." [STATIONARY.]

(Original.)

RANGES.		UNCERTAIN EFFECT.																									
		GOOD EFFECT.											POOR EFFECT.														
		DEADLY FIRE.						HEAVY FIRE.					ORDINARY FIRE.						INEFFECTUAL FIRE.								
Yards.																											
Within 100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	123	120	90	60	45	30	15	0	0			
100 to 200	x	x	x	x	x	x	x	x	x	x	x	230	229	200	171	142	113	84	57	42	28	14	0	0			
200 to 300	x	x	x	x	x	x	x	x	x	328	313	265	216	189	162	135	108	81	54	39	25	13	0	0			
300 to 400	x	x	x	x	x	x	428	419	373	327	291	245	200	175	150	125	100	75	50	37	23	12	0	0			
400 to 500	x	x	x	x	x	526	446	403	360	317	274	231	188	164	141	117	94	70	47	32	20	11	0	0			
500 to 600	x	x	x	588	572	495	419	378	338	297	257	216	176	154	132	110	88	66	44	30	18	10	0	0			
600 to 700	x	x	617	606	534	462	390	344	308	272	236	200	164	143	123	102	82	61	41	27	18	9	0	0			
700 to 800	x	634	624	560	491	425	358	323	289	254	220	185	151	132	113	94	75	56	37	26	17	8	0	0			
800 to 900	653	633	572	511	451	389	329	298	265	233	201	169	138	121	103	86	69	51	34	25	15	7	0	0			
900 to 1000	624	569	514	460	405	350	296	267	238	210	181	152	124	108	93	77	62	46	31	23	14	7	0	0			
1000 to 1200	595	543	492	441	390	339	288	259	231	203	175	147	119	104	89	74	59	44	29	21	13	6	0	0			
1200 to 1600	528	481	435	389	342	296	250	225	191	177	153	129	105	91	78	65	52	39	26	18	11	5	0	0			
1600 to 2000	470	423	387	346	305	264	223	201	180	158	137	115	94	83	71	59	47	35	23	16	10	5	0	0			
2000 to 2500	345	314	284	254	223	193	163	147	131	116	100	84	69	60	52	43	34	26	17	12	8	4	0	0			
2500 to 3000	221	201	182	162	143	123	104	94	84	74	64	54	44	38	33	27	22	16	11	8	4	2	0	0			
3000 to 4000	129	117	106	95	83	72	61	55	49	43	37	31	25	22	20	17	14	12	9	7	3	1	0	0			
4000 to 5000	38	34	31	28	24	21	18	16	14	12	10	8	7	7	6	5	4	3	2	1	0	0	0	0	0		
Over 5000	9	8	7	6	5	4	4	3	3	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0		

NOTE 1. To employ the table, see ¶ 298. See also ¶ 292, *et seq.*

" 2. For a consideration of the *data* upon which this table is founded, consult Table "c," Appendix F, and its accompanying notes.

" 3. When the table does not apply directly, the Referee may assist his judgment by referring to the Table of Multipliers (R), Rule VII. See ¶ 310, *et seq.*

TABLE R.—OF MULTIPLIERS.

FOR USE IN CONSULTING TABLES OF CASUALTY.

(Original Calculation.)

CASE.	CIRCUMSTANCES, Etc.		FOR DIRECT USE.		FOR SOUNDING-BOARD.		REFERENCES.		
			Party Firing.	Party Exposed.	Party Firing.	Party Exposed.			
1.	CHARACTER OF TROOPS.	Infantry. Calculated with reference to.....	1	.....	0	.....	{ Table "a," Appendix F. See Case 53; also, see Cases 40, 41, 42.
2.		Cavalry. { In General. Dismounted, etc.....	$\frac{6}{5}$	+2		{ Tables "c," "d," and "e," Appendix F. If in Column of Route. Cases 13 to 18. " "	
3.			" Horses <i>hors de combat</i>	$\frac{19}{20}$			0 to -1
4.			" Men ".....	$\frac{1}{4}$			-12
5.		Artillery.	In General. (No shelter, etc.) Hits.....	1	0	{ Tables "c," "d," and "e," Appendix F. If in Column of Route. Cases 13 to 18. " "	
6.			Men. Gunners and Cannoneers.....	.....	$\frac{1}{9}$	.....	-19
7.			Horses. <i>Hors de combat</i>.....	.....	$\frac{1}{3}$	.....	-9
8.			Carriages. (<i>Artillery firing</i>) Struck.....	.....	.....	.....	.....
9.			Cannoneers.....	.....	$\frac{15}{20}$	.....	-23
10.		Engineers.	Drivers.....	$\frac{20}{20}$	-26	Cases 13 to 18. " "	
11.			{ In ranks.....	1	.....	0	.....	
12.		{ Working, etc.....	0	$\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{16}$	-∞	-12, -18, or 23			
13.	TACTICAL FORMATION.	"Line of Battle".....	$\frac{1}{4}$	1	-12	0	{ See Section V, Appendix F.		
14.		"Heavy-Firing Line".....	$\frac{1}{2}$	$\frac{1}{2}$	-6	-6			
15.		"Thin-Firing Line".....	$\frac{3}{4}$	$\frac{1}{4}$	-3	-12			
16.		"Heavy Skirmish Line".....	$\frac{7}{8}$	$\frac{1}{8}$	-1	-18			
17.		"Thin Skirmish Line".....	1	$\frac{1}{16}$	0	-24			
18.		Company Column.....	{ Up to 1000 yards.....	1 to 2	0 to +6	{ See Ord. Notes, 111. See Appendix F, Section V, and Table "f."	
19.			{ Beyond " ".....	.....	2 (+)	.....	+6 (+)
20.		Closed Column of Divisions..	{ Up to 1000 yards.....	.....	2 to 3	.....	+6 to +9
21.			{ Beyond " ".....	.....	3 to 4	.....	+9 to +12
22.		Columns in General, according to front and depth.....	.....	$\frac{1}{2}$ to 4	.....	-6 to +12	
23.			First Line within 300 yards.....	.....	1	.....	0
24.			" " 300 to 500 ".....	.....	$\frac{2}{3}$	.....	-3
25.			" " 500 to 700 ".....	.....	$\frac{1}{2}$	.....	-6
26.			" " 700 to 1000 ".....	.....	$\frac{1}{5}$	.....	-14
27.			" " 1000 to 1200 ".....	.....	$\frac{1}{9}$	.....	-19
28.			" " 1200 to 1600 ".....	.....	$\frac{1}{15}$	.....	-23
29.			" " beyond 1600 ".....	.....	$\frac{1}{25}$	.....	-28
30.		Effect of Fire on 2d Lines, etc.	The above will be modified according to distance between the Lines, to wit: If less than 50 yards.....	.....	1	.....	0
31.				" 50 to 100 ".....	$\frac{3}{5}$	-5	
32.				" 100 to 200 ".....	$\frac{1}{3}$	-9	
33.				" 200 to 300 ".....	$\frac{1}{5}$	-14	
34.				" greater than 300 ".....	!	-!!!	
35.	POSTURE.	Erect.....	.....	1	.....	0	{ See Table A, p. 116, of Ord. Notes, 111. Table "f," Ap. F.
36.		Kneeling..... Lines ($\frac{1}{2}$), Column (1), or Generally.....	.....	$\frac{3}{4}$	.....	-8	
37.		Lying Down... { Lines.....	.....	$\frac{1}{4}$	.....	-12	
38.			{ Columns.....	$\frac{1}{2}$		-6	
39.	WEAPONS USED.	Rifle-Musket... Springfield.....	1	.....	0	.....	See "Description of Springfield Rifle and Carbine," National Armory, 1874.
40.		Carbine.....	{ Up to 400 yards.....	1 (-)	.....	-1, 0		
41.			{ 400 to 1000 ".....	1 to $\frac{1}{2}$	.....	0 to -6		
42.			{ Beyond 1000. ".....	$\frac{1}{2}$ to $\frac{1}{10}$	.....	-6 to -20		
43.		3 $\frac{1}{2}$ " Rifle..... Times the effect of 3" Rifle.....	.....	$\frac{3}{2}$	.....	+3	
44.	4 $\frac{1}{2}$" "..... " " ".....	.....	3 (\pm)	.....	+9		

TABLE R.—OF MULTIPLIERS (*Continued*).

CASE.	CIRCUMSTANCES, Etc.		FOR DIRECT USE.		FOR SOUNDING-BOARD.		REFERENCES.
			Party Firing.	Party Exposed.	Party Firing.	Party Exposed.	
45.	NATURE OF FIRE, ETC.	Direct. Tables so calculated..	1	1	0	0	Appendix F, Section IV.
46.		Slant or Oblique, i. e., more than 30°	$\frac{1}{2}$	$\frac{3}{2}$	-6	+3	
47.		Enfilade		2		+6	
48.		Curved, Unaimed, etc.		$\frac{1}{3}$ to $\frac{1}{10}$		-9 to -20	
49.		Night		$\frac{1}{2}$		-6	
50.		Unanswered	$\frac{3}{2}$		+3		
51.		Accidental (supports, reserves, etc., randoms, etc.)	$\frac{1}{50}$		-34		
52.		From a Rest.	2		+6		
53.		From Horseback	$\frac{1}{3}$		-9		
54.	TABULAR UNIT, ETC.	When the number firing is less than contemplated in the Tables, use a proportional Multiplier, i. e., ordinarily.....	$\frac{1}{8}$		-y		See Appendix J, Key, Plate VIII.
55.	QUALITY OF FIRE VERSUS QUANTITY.	(2)	$\frac{3}{2}$		+3		Target effect should not materially alter from the mean, but Battle effect is relatively lessened because of waste hits, etc.
56.		When two or more units have a concentrated fire upon the same object, not directly in their front, the following	2		+6		
57.		Multipliers will be respectively employed (see Ordnance Note 112, page 126), instead of those in parentheses,	$\frac{7}{8}$		+7		
58.		(5)	$\frac{8}{8}$		+8		
59.		(6)	3		+9		
60.		(7)	$\frac{19}{6}$		+10		
61.		(8)	$\frac{10}{3}$		+11		
62.	TIME.	The tabular time being one minute for any different period, as z, multiply by.....	x		±y		See Appendix J, Key, Plate VIII.
63.	MOTION.	Charging.....	0	$\frac{1}{2}$	-!!!!	-14	
64.		Double Time.....	0	$\frac{1}{3}$	-!!!!	-9	
65.		Advancing. Quick ".....	$\frac{1}{4}$	$\frac{1}{2}$	-12	-6	
66.		Rushes ".....	$\frac{1}{2}$	$\frac{3}{4}$	-6	-3	
67.		Difficult Ground, etc.....	$\frac{1}{3}$	1	-9	0	
68.		Double Time.....	0	$\frac{1}{10}$	-!!!!	-20	
69.		Retiring. Quick ".....	$\frac{1}{10}$	$\frac{1}{2}$	-20	-14	
70.		Making occasional "stands," etc.....	$\frac{1}{3}$	$\frac{1}{2}$	-9	-6	
71.		Ground difficult (slow, etc.).....	$\frac{1}{6}$	1	-14	0	
72.		Directly across Line.....		1		0	
73.	INFLUENCE OF SLOPES.	Up Hill. { 5° Inclination.....	$\frac{1}{2}$		-6		See Table of Slopes (D); also, Wolseley and Lehmon.
74.		Infantry. { 10° ".....	$\frac{1}{2}$		-14		
75.		Infantry. { 15° ".....	$\frac{1}{2}$		-26		
76.		Infantry. { 20° ".....	$\frac{1}{2}$		-!!!!		
77.		Artillery. { 5° ".....	$\frac{1}{10}$		-20		
78.		Artillery. { 10° ".....	$\frac{1}{30}$		-30		
79.		Down Hill. { 5° ".....	$\frac{4}{5}$		-2		
80.		Infantry. { 10° ".....	$\frac{1}{2}$		-6		
81.		Infantry. { 15° ".....	$\frac{1}{2}$		-14		
82.		Infantry. { 20° ".....	$\frac{1}{2}$		-23		
83.		Artillery. { 5° ".....	$\frac{2}{5}$		-8		
84.		Artillery. { 10° ".....	$\frac{1}{5}$		-23		
85.	NATURE OF COVER.	Earthworks. { Intrenchments. (Regular.).....	$\frac{1}{25}$			-28	Protection to cannoneers.
86.		Earthworks. { Breastwork, simple. (4½' high.).....	$\frac{1}{5}$			-14	
87.		Earthworks. { Simplest form of Trench. (Hasty.).....	$\frac{1}{4}$			-12	
88.		Earthworks. { Rifle-pits. (Trowel, bayonet, etc.).....	$\frac{1}{3}$			-9	
89.		Gun-Screens (Steel, etc.).....	$\frac{1}{2}$			-6	

TABLE R.—OF MULTIPLIERS (Continued).

CASE.	CIRCUMSTANCES, Etc.		FOR DIRECT USE.		FOR SOUNDING-BOARD.		REFERENCES.
			Party Firing.	Party Exposed.	Party Firing.	Party Exposed.	
90.	NATURE OF COVER (Continued).	Hedges.	Under 6' high. Natural state.....	$\frac{1}{2}$	—6	Manuals on Intrenchments, etc., Duane, Ernst, Mahan, etc.
91.			“ “ If prepared for defense.....	$\frac{1}{3}$	.....	—14
92.			Over “ Natural state.....	$\frac{1}{3}$	.....	—9
93.			“ “ If prepared for defense.....	$\frac{1}{10}$	.....	—20
94.		Walls.	Under 4' high. (If prepared for defense, $\times \frac{1}{2}$).....	$\frac{1}{2}$	.....	—6
95.			4½' high. (“ “ $\times \frac{2}{3}$).....	$\frac{1}{3}$	.....	—9
96.			4½' to 6' high. (“ “ $\times \frac{1}{3}$).....	$\frac{1}{3}$	.....	—14
97.			6' and over. (“ “ $\times \frac{1}{3}$).....	$\frac{1}{10}$	.....	—20
98.		Woods, etc.	If along the skirts.....	$\frac{1}{2}$	.....	—6
99.			If concealed in thickness of.....	$\frac{2}{5}$	.....	—28
100.			Orchard, Groves, etc.....	$\frac{1}{4}$	.....	—12
101.			Heavy Grain-field, etc.....	$\frac{1}{10}$	.....	—20
102.		Abatis.....	.....	$\frac{1}{3}$	.....	—14
103.		Barricades.	Preparations hasty (less than 1 hour). If Artillery be firing, $\times 10$	$\frac{2}{3}$	.....	—3
104.			Preparations more careful (2 to 4 hours). If Artillery be firing, $\times 10$	$\frac{1}{3}$	.....	—9
105.			Preparations well made (over 4 hours). If Artillery be firing, $\times 10$	$\frac{1}{3}$	.....	—14
106.		Palisade.	If Artillery be firing, $\times 10$	$\frac{1}{2}$	.....	—6
107.		Stockade.	“ “	$\frac{1}{10}$	.....	—20
108.	ENGINEER WORK.	To give artificial cover, etc., while in Progress.	At commencement.....	1	0	In which x = multiplier due to nature of work in progress. See Cases 85–107.
109.			$\frac{1}{2}$ completed.....	$4x$	.....	.....
110.			$\frac{1}{4}$ “	$2x$	.....	.....
111.			$\frac{1}{8}$ “	$\frac{4}{3}x$	.....	.....
112.			Finished.....	x	.....	.....
113.	NATURE OF GROUND.	In front of.	Hard and even.....	1	0	
114.			Irregular or soft.....	$\frac{6}{7}$	.....	—1
115.			Plowed.....	$\frac{6}{8}$	.....	—2
116.			Broken stones, large pebbles, etc. (Artillery).....	$\frac{6}{2}$	.....	—3
117.	MATERIAL.	Showing increased effect due to liability to splinter, &c., due to Artillery Fire.	Earth.....	1	0	
118.			Brick.....	$\frac{4}{3}$	.....	+3
119.			Wood.....	$\frac{3}{3}$	.....	+3
120.			Stone.....	2	.....	+6
121.			Hasty barricade.....	3	.....	+9
122.			Well-made barricade.....	2	.....	+6
123.	EFFECT OF MORAL CONDITION UPON FIRE.	Troops fresh.....	1	0	
124.		“ somewhat shaken. Heavy fire, having lasted 10 mins..	$\frac{3}{4}$	.....	—3	.....
125.		“ shaken. “ “ “ ..	$\frac{1}{3}$	.....	—9	.....
126.		“ badly shaken. “ “ “ ..	$\frac{1}{10}$	.....	—20	.....
127.		“ in disorder.....	$\frac{1}{25}$	.....	—28	.....
128.		“ in great confusion.....	0 ($\frac{1}{50}$)	.....	—34, —!	.....
129.		“ routed, etc.....	0?	.....	—!!!	.....
130.		Enthusiastic.....	$\frac{4}{3}$	.....	+3	.....
131.		Flushed with victory.....	$\frac{3}{2}$	.....	+3	.....
132.		Successful (simply).....	1	.....	0	.....

TABLE R.—OF MULTIPLIERS (*Continued*).

CASE.	CIRCUMSTANCES, Etc.		FOR DIRECT USE.		FOR SOUNDING-BOARD.		REFERENCES.
			Party Firing.	Party Exposed.	Party Firing.	Party Exposed.	
133.	MISCELLANEOUS.	Battery having lost 60 Cannoneers.....	$\frac{3}{4}$	—3	See ¶ 814, etc. For Machine Guns $\times \frac{1}{4}$.
134.		“ 72 “	$\frac{1}{2}$	.....	—6	.....
135.		“ 78 “	$\frac{1}{6}$	.....	—14	.....
136.		“ 79 “	$\frac{1}{6}$	.....	—16	.....
137.		Efficiency. “ 82 “	$\frac{1}{4}$	—17	See Tables of Fire, Appendix F, and § 1,221, Light Artillery Tactics.
138.		“ 85 “	$\frac{1}{10}$	.....	—20	.....
139.		“ 88 “	$\frac{1}{15}$	.....	—23	.....
140.		“ 91 “	$\frac{1}{30}$	.....	—30	.....
141.		“ 94 “	0	—!!!!	See Report of Chief of Ord., 1879.
142.		Artillery employing only 1200 to 1500 yards....	$\frac{1}{2}$	.....	—6	.....
143.		Diminished occasional fire, i. e., 1500 “ 2000 “	$\frac{1}{3}$	.....	—9	.....
144.		rapidity. where rapidity is not 2000 “ 3000 “	$\frac{1}{5}$	.....	—14	.....
145.		sought. 3000 “ 4000 “	$\frac{1}{6}$	—16	
146.		Multiball- } Revolver at 30 to 100 yards.....	2 to 3	.....	+ (6 to 9)	.....
147.		C’tridge. } Rifle and Carbine at 100 to 300 yards.....	2 to 3	+ (6 to 9)	

TABLE S.

"CHANCES OF SUCCESS."

The ratios contained in this table have special reference to "final rushes" and to hand-to-hand conflicts, though they may be employed by the Referee to suit cases that will apply. They may be altered for sufficient cause, and the table itself, as well as all the others accompanying these rules, should be amended and enlarged as experience in playing and data obtained from reading and study may from time to time suggest. (§§ 385, 386.)

The turn in which the final rush is to be made having arrived, the compound ratio (Rule IV and page 321), expressing the "chances of success" in the case, will be determined, and will be employed in consulting the dice for two distinct purposes: First. To determine whether the result of the conflict shall be decided the same turn or not. Second. To determine that result. Should the first decision of the dice be such as to force a continuance of the conflict, the dice will be reconsulted the succeeding turn, and so on, until by them this termination is called for; in no case, however, shall this termination be delayed beyond five minutes. When the decision arrived at is such as to terminate the affair at any particular time, the dice must be thrown again, immediately, to determine the result. (§ 330, etc.) Whenever the result of a final rush, hand-to-hand conflict, etc., has been delayed from minute to minute, the losses for both sides will be calculated at the rate given in the Table of Results and Consequences (Table T).

(Foreign Tables altered, enlarged, and brought down to date.)

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
1.	VETERANS versus NEW TROOPS.	4 : 1	VETERANS.	Cæsar's estimate, 2 : 1.
2.	FRESH Troops versus Troops some time in action, i. e., NOT FRESH.	4 : 3	FRESH.	
3.	Troops OUTNUMBERED, 2, 3, etc., to 1. Guns " "	2, etc. : 1	STRONGER.	So far as mere relative strength goes, the <i>chances of success</i> of any one of the following formations as against another may be regarded as EVEN: 1 Regiment of Infantry (1,000 men) in Column; $\frac{1}{2}$ Regiment of Infantry in Line; 2 Companies of Skirmishers (200 men); 1 Battalion of Cavalry (4 Companies or Squadrons, 400 men) in Line; 1 Battery of Artillery (6 guns).
4.	Troops attacked by SURPRISE if in line. " " " " If in column. " " " " If in Skirmishing order. " " " " If already in <i>mêlée</i> , charging, etc.	3 : 2 3 : 1 2 : 1 4 : 1	ASSAILANT. " " "	
5.	FRONT and FLANK attack combined. REVERSE " " " FRONT FLANK and REVERSE attack combined. Simple Flank attack.	4 : 1 5 : 1 8 : 1 2 : 1	ASSAILANT. " " "	With reference to Cavalry, one company attacking in flank is regarded as producing as much effect as two attacking in front. If a force of Cavalry is attacked during a flank movement by Cavalry the chances are 4 : 1 against it.
6.	Victorious but SOMEWHAT SHAKEN Troops Defeated and " " " Victorious and SHAKEN Troops. Defeated " " " Victorious but BADLY SHAKEN Troops. Defeated and " " " Troops in DISORDER. " GREAT CONFUSION. " ROUTED. " TOTALLY ROUTED. " FLUSHED WITH VICTORY. " in high state of enthusiasm.	Even. 3 : 2 3 : 2 2 : 1 2 : 1 3 : 1 5 : 1 10 : 1 ? ? 3 : 1 5 : 1	ASSAILANT. " " " " " " " " " FLUSHED. ENTHUSIASTIC.	In the case of Cavalry, double the adverse chances throughout. The terms here employed are of course merely conventional ones. (See Cases 1 to 11, Table L.) Referee decides according to circumstances.
7.	Troops under COVER (i. e., ordinary, as woods, grain, vineyards, behind hedges, fences, etc.) versus Troops IN THE OPEN. Troops INTRENCHED versus Troops IN THE OPEN, according to nature of Intrenchment.	2-5 : 1 5-35 : 1	COVERED. INTRENCHED.	(See Cases 85 and 107, Table R.) Troops darting from cover to cover across dangerous spaces, etc., come under this case. Where two or more lines support each other, defeat, etc., affects only the first, and the others successively according to the method of attack. For various characters of intrenchments and their relative values, see Cases 22 to 41, Table G, and various cases given in Table R.
8.	Troops on COMMANDING HEIGHTS (i. e., greater than 5° slope) versus Attacking Troops.	2-35 : 1	HEIGHTS.	Chances will generally increase for those on <i>heights</i> in a geometrical ratio (i. e., 2, 4, 8, 16, 32, etc., : 1), with every addition at 5° over the first 5°. (See Table D.) In the case of Cavalry, however, the chances are <i>even</i> , if those attacked <i>advance to receive the shock</i> . Cavalry which does not so advance is under adverse chances 12 : 1. CAVALRY VERSUS CAVALRY. If an officer commanding a force of Cavalry resolves to attack another force of the same arm, he will notify the Referee of his intention, who will communicate it to the other party, and ask the latter his intentions (i. e., whether he will retire, advance to receive the attack, etc.). If the attack be not met, the party declining must retreat to a distance assigned by the Referee, or hold his ground under the adverse chances above given. If the threatened party accepts battle, it is incumbent upon each to advance at least 300 yards toward its accomplishment, and no alteration in the original orders can be made until this is done.
9.	DEFENSIVE, versus OFFENSIVE, in general (i. e., "in the open").	3 : 2	DEFENSE.	
10.	Troops on the defensive, and which have just gained an advantage over offensive Infantry or Cavalry, if immediately REATTACKED by fresh INFANTRY. Same, if REATTACKED by fresh CAVALRY.	3 : 2 2 : 1	ASSAILANT. "	For every FRESH ATTACK made upon a point obstinately defended after the second, the terms of the ratios opposite favoring the assailant will be increased by <i>unity</i> .

TABLE S (Continued).

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
11.	Infantry in LINE versus Infantry in COLUMN.	2 : 1	LINE.	<p>Whenever a decision adverse to Infantry in Line as against Infantry in Column is obtained from the dice, an excess of 2 spots will be allowed in determining "results" and "consequences" by Table I, after the several regulations and modifications called for by the Notes thereon have been applied.</p> <p>If an attack of Cavalry on Infantry does <i>not</i> succeed, the Referee will generally find it necessary to alter the application of Table T, so as to lessen the "consequences of defeat"; but, if in retreat the defeated Cavalry is pursued and attacked by hostile Cavalry during its first five minutes of flight, these consequences will again increase.</p> <p>A Cavalry attack upon Infantry which succeeds at all will be very sure to do so at a serious disadvantage to the latter. When, therefore, the elementary ratio in point of numerical strength (Case 3 this Table) is not greater than 4 : 1 against the Cavalry, Note 4 to Table T will be inactive, and successful Cavalry may estimate their victory on a basis of at least 3 spots, and have the latitude of their throw above that basis. When this ratio of numerical strength is between 4 and 6 : 1 against the Cavalry, Note 4, Table T, will still remain inoperative, and Cavalry simply gain the latitude of their throw; while, if this ratio be greater than 6 : 1 against them, Note 4 will be allowed to operate, and may be modified if necessary (Referee) to suit the case.</p> <p>Cavalry engaged in hand-to-hand conflict with Infantry, and attacked by fresh Infantry, is disadvantaged by the ratio 2 : 1; if attacked by fresh Cavalry, the disadvantage is expressed by a ratio of from 4 to 6 : 1.</p> <p>Every Cavalry attack should be in the proportion of at least 1 : 6 in point of strength, and Infantry which does not await it stationary will be considered as disadvantaged 4 : 1 if overtaken in flight.</p> <p>Defeated Cavalry must retire at a gallop directly to the rear for several minutes, or until it reaches its "supports," "cover," etc.</p> <p>If the defeat is indicated by at least 3 spots in preponderance (Table T), and pursuit is made and continued five minutes by hostile Cavalry, it will be considered as "totally routed." Referee will always allow flying Cavalry to distance its pursuers. When beaten Cavalry encounters serious obstacles during the early part of its retreat, it is to be declared more or less routed, and may even disappear from the map.</p> <p>Infantry threatened by Cavalry may run for cover if such be within 300 yards, but are to be regarded as <i>in disorder</i> if they reach it. If, however, at the instant they commence the retreat, the Cavalry is within 500 yards, the hand-to-hand conflict will take place to the disadvantage of the Infantry (4 : 1). (See Note on Cases 14 and 15.) Cavalry that has moved over a considerable distance at a rapid gait is "somewhat shaken" or "shaken"; if it has attacked several times, it is "badly shaken," "in disorder," etc., as the Referee may decide (Case 6, this Table).</p> <p>Unless a hand-to-hand conflict ensues, Skirmishers are not supposed to suffer from Cavalry attacks.</p> <p>Guns in the open attacked <i>in flank</i> by Cavalry are to be considered as captured if the Cavalry approaches unobserved to within charging distance.</p> <p>Guns under cover and attacked <i>in flank by Cavalry</i>, and at the same time <i>in front</i> by other troops, are to be regarded as captured. Artillery in motion and overtaken by Cavalry is always considered as captured.</p> <p>Difficulty commences at slopes of 5° and increases (see Table D) up to 15°, beyond which degree of inclination it is considered impossible for Cavalry to charge (up or down).</p> <p>(See Case 16, Table of Possibility I.) Referee decides according to circumstances.</p> <p>If the decision is adverse to Artillery, the guns are captured if the Skirmishers have been allowed to approach within 350 yards. If the attack is unsuccessful, the Skirmishers may seek cover, or retire beyond 350 yards and lie down, subject to Case 14 (modified), Table of Duration. The "final rush" may be attempted from either of the opposite distances.</p>
12.	Infantry on the defensive, and which assumes the offensive to meet a bayonet attack by other Infantry, i. e., DEFENSIVE-OFFENSIVE versus OFFENSIVE.	2 : 1	DEFEN.-OFFEN.	
13.	Infantry in hand-to-hand conflict with CAVALRY, the former having attacked and the latter being so situated (ambushed, etc., in a defile) as to be unable to act offensively.	5 : 1	INFANTRY.	
14.	Fresh INFANTRY in Line attacked by CAVALRY. Same, if in Column.	5 : 1 3 : 1	INFANTRY. "	<p>Infantry threatened by Cavalry may run for cover if such be within 300 yards, but are to be regarded as <i>in disorder</i> if they reach it. If, however, at the instant they commence the retreat, the Cavalry is within 500 yards, the hand-to-hand conflict will take place to the disadvantage of the Infantry (4 : 1). (See Note on Cases 14 and 15.) Cavalry that has moved over a considerable distance at a rapid gait is "somewhat shaken" or "shaken"; if it has attacked several times, it is "badly shaken," "in disorder," etc., as the Referee may decide (Case 6, this Table).</p> <p>Unless a hand-to-hand conflict ensues, Skirmishers are not supposed to suffer from Cavalry attacks.</p> <p>Guns in the open attacked <i>in flank</i> by Cavalry are to be considered as captured if the Cavalry approaches unobserved to within charging distance.</p> <p>Guns under cover and attacked <i>in flank by Cavalry</i>, and at the same time <i>in front</i> by other troops, are to be regarded as captured. Artillery in motion and overtaken by Cavalry is always considered as captured.</p> <p>Difficulty commences at slopes of 5° and increases (see Table D) up to 15°, beyond which degree of inclination it is considered impossible for Cavalry to charge (up or down).</p> <p>(See Case 16, Table of Possibility I.) Referee decides according to circumstances.</p> <p>If the decision is adverse to Artillery, the guns are captured if the Skirmishers have been allowed to approach within 350 yards. If the attack is unsuccessful, the Skirmishers may seek cover, or retire beyond 350 yards and lie down, subject to Case 14 (modified), Table of Duration. The "final rush" may be attempted from either of the opposite distances.</p>
15.	INFANTRY in Column and "somewhat shaken"; Infantry badly shaken, and rallied in masses, etc., attacked by CAVALRY.	3 : 2	INFANTRY.	
16.	INFANTRY in motion, and charged by CAVALRY from a distance of 400 yards or less.	2 : 1	CAVALRY.	
17.	SKIRMISHERS attacked by CAVALRY, when a hand-to-hand conflict takes place.	3 : 2	SKIRMISHERS.	<p>Unless a hand-to-hand conflict ensues, Skirmishers are not supposed to suffer from Cavalry attacks.</p> <p>Guns in the open attacked <i>in flank</i> by Cavalry are to be considered as captured if the Cavalry approaches unobserved to within charging distance.</p> <p>Guns under cover and attacked <i>in flank by Cavalry</i>, and at the same time <i>in front</i> by other troops, are to be regarded as captured. Artillery in motion and overtaken by Cavalry is always considered as captured.</p> <p>Difficulty commences at slopes of 5° and increases (see Table D) up to 15°, beyond which degree of inclination it is considered impossible for Cavalry to charge (up or down).</p> <p>(See Case 16, Table of Possibility I.) Referee decides according to circumstances.</p> <p>If the decision is adverse to Artillery, the guns are captured if the Skirmishers have been allowed to approach within 350 yards. If the attack is unsuccessful, the Skirmishers may seek cover, or retire beyond 350 yards and lie down, subject to Case 14 (modified), Table of Duration. The "final rush" may be attempted from either of the opposite distances.</p>
18.	CAVALRY making a front attack on ARTILLERY in action.	4 : 1	ARTILLERY.	
19.	Cavalry charging down SLOPES (according to their inclination).	2-4 : 1	ASSAILED.	
20.	Cavalry CHARGING and encountering more or less serious OBSTACLES within 350 yards of the enemy.	2-6 : 1	ASSAILED.	<p>Unless a hand-to-hand conflict ensues, Skirmishers are not supposed to suffer from Cavalry attacks.</p> <p>Guns in the open attacked <i>in flank</i> by Cavalry are to be considered as captured if the Cavalry approaches unobserved to within charging distance.</p> <p>Guns under cover and attacked <i>in flank by Cavalry</i>, and at the same time <i>in front</i> by other troops, are to be regarded as captured. Artillery in motion and overtaken by Cavalry is always considered as captured.</p> <p>Difficulty commences at slopes of 5° and increases (see Table D) up to 15°, beyond which degree of inclination it is considered impossible for Cavalry to charge (up or down).</p> <p>(See Case 16, Table of Possibility I.) Referee decides according to circumstances.</p> <p>If the decision is adverse to Artillery, the guns are captured if the Skirmishers have been allowed to approach within 350 yards. If the attack is unsuccessful, the Skirmishers may seek cover, or retire beyond 350 yards and lie down, subject to Case 14 (modified), Table of Duration. The "final rush" may be attempted from either of the opposite distances.</p>
21.	1 Company of SKIRMISHERS (with 1 in support) firing, advancing, versus 1 BATTERY of Artillery, both in the open, distance 350 yards. Same, within 200 yards. (See Case 4, Table I.)	2 : 1 4 : 1	SKIRMISHERS. "	

TABLE S (Continued).

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	RATIO.	FAVORING.	REMARKS, REFERENCES, Etc.
22.	Half Regiment of INFANTRY in Line, attacking a Battery of ARTILLERY from within 300 yards, both "in the open." Same, within 100 yards.	3 : 1 5 : 1	INFANTRY. "	<p>If the decision is adverse to Artillery, the guns are regarded as captured. If adverse to Infantry in Line or Column, it must retire (See Cases 6 and 7, Table of Possibility; also Case 19, Table L.) The charge may be attempted from either of the opposite distances.</p> <p>(See Notes and references to Case 22, this Table.) If guns, not under cover, allow Infantry to approach unobserved within 200 yards of them, they will probably lose so many men and horses in the next few minutes which follow the opening of Infantry fire that part or the whole of the guns must be abandoned, and in 5 minutes all of the guns are to be considered captured without loss to the Infantry.</p> <p>RECAPTURES, etc.—If a force of Infantry or Cavalry captures a battery, but is driven back immediately after the capture has been effected, the battery may manoeuvre or come into action after 5 minutes have elapsed. But, if the guns are held two or three minutes, the battery may not manoeuvre or come into action for 10 or 15 minutes, and, for every additional minute during which the guns are so held, an additional period of 5 minutes must be allowed to elapse before the Artillery can recover sufficiently to take part in the action. Should the guns be held at least 10 minutes, they may not take further part in the action if recaptured. While so held, the losses to the battery amount, in men and horses, to the quota for one piece or caisson successively for each minute.</p>
23.	1 Regiment of INFANTRY in close Columns of Attack, versus 1 Battery of ARTILLERY, both "in the open," at 200 to 100 yards.	2 : 1	ARTILLERY.	
24.	Attacks on WOODS, VILLAGES, DEFILES, etc., by Skirmishers, if not preceded by at least 20 minutes' fire.	4 : 1	DEFENSE.	<p>Under ordinary circumstances <i>heavy skirmish order</i> is sufficient for the strong occupation of such positions. In special cases, where very strong occupation is desired, it may be taken in <i>heavy firing order</i>. Possibility to advance over intermediate ground must be decided independently. For every additional period of 10 minutes of preparatory fire, the terms of the opposite ratios favoring the defense will be decreased by unity (1). If the village, etc., is <i>specialty</i> strong by nature, considerable preparatory fire will always be necessary, and the terms of the ratios opposite will be increased by from 1 to 4 in favor of the defensive. When, too, special arrangements for defense, as behind walls, loop-holes, etc., have been made, Artillery <i>must</i> be employed by the assailants to prepare their way. In the attack of second lines of defense, as when <i>rallies</i> have been made behind walls, trenches, etc., a period of at least 10 minutes' preparatory fire must be resorted to by the assailants before attempting to carry them.</p>
	Same, if so (immediately) preceded.	2 : 1	"	
25.	Same, by Infantry in Line or Column (if not preceded by any) on at least 30 to 60 minutes' preparatory fire of ARTILLERY or Skirmishers.	6 : 1	"	
	Same, if so preceded, and immediately followed up.	4 : 1	"	

TABLE T.

SHOWING THE LOSSES IN HAND-TO-HAND CONFLICTS, PER HOSTILE REGIMENT AND SQUADRON, FOR BOTH OFFENSE AND DEFENSE, ACCORDING AS EITHER IS VICTORIOUS OR DEFEATED, ARRANGED AS TO THE ACTUAL NUMBER OF SPOTS SHOWN UPON THE FACE OF THE DIE THROWN BY EACH SIDE. ALSO, THE "RESULTS OF VICTORY" AND "CONSEQUENCES OF DEFEAT" FOLLOWING AN ATTACK, FINAL RUSH, CHARGE, ETC., GRADUATED ACCORDING TO IMPORTANCE, AS INDICATED BY THE EXCESS OF ONE THROW OVER THE OTHER IN SPOTS.

(Original.)

WINNING SIDE.												LOSING SIDE.											
OFFENSIVE.						DEFENSIVE.						DEFENSIVE.						OFFENSIVE.					
4	5	6	7	8		3	4	5	6	7	8		7	8	10	13	14	8	9	11	13	15	18
0	1	2	3	4		0	0	1	2	3	4		1	2	3	4	5	1	2	3	4	5	6
"RESULTS OF VICTORY."												"CONSEQUENCES OF DEFEAT."											
						Is regarded as an <i>advantage</i> for the defensive, but leaves the result still pending and undecided.						Tie.						<i>A check.</i> Troops falter. Leaves decision still open, but regards the attempt as being in operation.					
<i>A temporary success</i> ; barely carries the desired position; troops <i>badly shaken</i> , and may not pursue their advantage or resume the offensive for 10 minutes.						<i>A decided advantage</i> ; the attack gallantly repelled, but troops somewhat <i>shaken</i> ; may not assume offensive for 10 minutes.												<i>A repulse.</i> Troops <i>badly shaken</i> and driven back. May not renew the attack for 10 minutes.					
<i>A difficult victory</i> ; position carried, but troops somewhat <i>shaken</i> ; may not pursue their advantage or resume the offensive for 5 minutes.						<i>A very closely contested victory.</i> Troops still somewhat <i>shaken</i> and incapable of assuming offensive for 5 minutes.												<i>A partial defeat.</i> Troops driven back in <i>disorder</i> , and may not renew the attack for 15 minutes.					
<i>A brilliant victory</i> ; position carried and one eighth of defenders taken prisoners. Troops well in hand; may pursue advantage immediately, and continue pursuit 5 minutes, capturing one fourth the remainder as prisoners; pursuit to be followed by 5 minutes devoted to reorganization. If no pursuit is made, will be considered as completely reorganized in 5 minutes. If attacked while unorganized must forfeit one chance.						<i>A victory</i> ; troops <i>enthusiastic</i> and organization good; may assume the offensive and pursue for 5 minutes, capturing one fourth the retreating troops, the pursuit to be followed by 5 minutes devoted to reorganization; may assume offensive immediately thereafter. If no pursuit is made, may assume offensive at any moment.												<i>A serious defeat.</i> Troops driven back in <i>great confusion</i> . If pursued for 5 minutes, will lose one fourth strength in missing. May not renew the attack or assume offensive for 30 minutes. If attacked while in confusion, under adverse chances, greater than 4 : 1, must surrender one third force, rest escaping <i>hors de combat</i> . After 30 minutes, not having been pursued or attacked, can resist as <i>shaken</i> troops.					
<i>An easy and decided victory</i> ; one fourth the opponents taken prisoners. Troops <i>enthusiastic</i> and in perfect organization. May pursue immediately and to any length, taking as many more prisoners, if pursuit be continued at least 10 minutes. Can assume offensive or resist attack at any moment.						<i>A brilliant victory.</i> Troops <i>enthusiastic</i> and organization perfect. May pursue for 10 minutes, capturing one third the defeated troops. A rally of 5 minutes' duration must follow pursuit, after which may assume offensive. If no pursuit is made, may assume offensive at any moment. If attacked during pursuit or rally, may assume defensive as <i>fresh</i> troops.												<i>Completely routed</i> , with loss of one half strength in missing. If pursued, the remnant will be completely scattered and lost. If not pursued, the remnant is <i>hors de combat</i> for the day, their organization being cut to pieces. If <i>completely routed</i> troops are attacked under adverse chances, greater than 2 : 1, they must surrender.					
<i>A complete victory</i> , resulting in the total capture of the opposing troops. <i>Enthusiasm at the highest pitch.</i> Can resume offensive at any moment.						<i>A complete victory</i> , resulting in the capture of one fourth the opposing troops as prisoners. <i>Enthusiasm at the highest pitch.</i> Organization perfect. May pursue to any length. If pursuit is made for at least 10 minutes, one half of the scattered remnant may be taken prisoners.												<i>Total surrender</i> of the entire force.					
																		<i>A total rout.</i> One fourth strength lost as missing. Remnant put to flight and <i>hors de combat</i> for the day. If pursued, the remnant will be completely scattered and lost, and will be recorded missing. If totally routed troops are attacked, they must surrender.					

N. B.—For important Notes on this Table and its use, see Text, ¶ 344.

TABLE U.

(Original)

GAME RATIO, RED VERSUS BLUE.												
TIME, Etc.	RATIOS OF POSSIBILITY.					CHANCES OF SUCCESS.					FINAL RATIOS.	REMARKS.
	Tactics.	Strategy.	Topog'phy.	Accidental.	General.	Tactics.	Strategy.	Topog'phy.	Accidental.	General.		
	2 : 3				2 : 3		2 : 3			2 : 3	4 : 9	See Example I, Table I.
	6 : 1 4 : 1			1 : 4	6 : 1		5 : 2			5 : 2	15 : 1	See Example II, Table I.
						3 : 1	$\left\{ \begin{array}{l} 1 : 2 \\ 1 : 2 \\ 1 : 4 \\ 2 : 1 \\ 4 : 1 \\ 4 : 1 \end{array} \right\}$		2 : 3 1 : 2	$\left\{ \begin{array}{l} 1 : 8 \\ 16 : 1 \end{array} \right\}$	2 : 1	See Example II, Table S.
						3 : 1	$\left\{ \begin{array}{l} 1 : 2 \\ 1 : 3 \end{array} \right\}$		4 : 3	2 : 3	2 : 3	See Example I, Table S.
	16 : 1			1 : 4	4 : 1	9 : 1	5 : 9		4 : 9	20 : 9	80 : 9	

SUMMARY: RATIOS OF RED VERSUS BLUE.

Tactical play =	144 : 1
Strategical play =	5 : 9
Accidental " =	1 : 9
General play { =	80 : 9
say.	9 : 1
Possibility has favored Red.	4 : 1
Chances have favored Red.	20 : 9

TABLE W.

FOR RECORDING LOSSES AND CAPTURES.

NUMBER.	LOSSES.										CAPTURES.				
	KILLED AND WOUNDED.					MISSING.					PRISONERS.				
	INFAN'TY.		ARTILLERY.			Infantry.	Cavalry.	Artillery.	Engineers.	Guns, etc.	Infantry.	Cavalry.	Artillery.	Engineers.	Guns, etc.
	Line and Column.	Skirmishers.	Cavalry.	Mounted.	Horse.	Position.	Gatling, etc.	Engineers.							
1.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6.	•	•	•	•	•	•	•	•	•	×	•	•	•	•	×
7.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
9.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
10.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
15.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
20.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
25.	•	•	•	×	×	×	×	•	•	×	•	•	•	•	•
30.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
40.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
50.	×	×	×	•	•	•	•	×	×	•	•	•	•	•	•
75.	•	•	•	•	•	•	×	•	•	×	•	•	•	•	•

TABLES TO THE APPENDICES.

APPENDIX E.

TABLE "a," giving a Synoptical Statement concerning the Total Number of Deaths in the Army of the North during the Rebellion (i. e., up to June 30, 1865).

	Regulars.	White Volunteers.	Colored Volunteers.	Total.
Killed in battle.....	1,355	41,369	1,514	44,238
Died of wounds, accidents, and injuries.....	1,174	46,271	1,760	49,205
Suicide, homicide, and execution.....	27	442	57	526
Died of disease.....	3,009	153,995	29,212	186,216
Unknown causes.....	159	23,188	837	24,184
Total.....	5,724	265,265	33,380	304,369

By consolidating the deaths from violent causes in the foregoing table, we obtain the following more general view of the same subject :

TABLE "b."

	Regulars.	White Volunteers.	Colored Volunteers.	Total.
Violent deaths.....	2,556	88,082	3,331	93,969
Deaths from disease.....	3,009	153,995	29,212	186,216
Unknown causes.....	159	23,188	837	24,184
Total.....	5,724	265,265	33,380	304,369

TABLE "c," showing the Average Mean Strength of the Various Classes of Troops serving during the Rebellion in the Northern Armies.

(Original.)

CHARACTER OF TROOPS.	Present.	Absent.	Aggregate.
Regulars.....	17,735	5,194	22,929
Volunteers.....	544,704	196,803	741,507
White Troops.....	562,439	204,997	764,436
Colored Troops.....	35,640	6,699	42,339
Mixed Troops.....	598,079	211,696	808,775

Regulars considered from January 1, 1861, to January 1, 1865 (48 months). Volunteers considered from July 1, 1861, to March 31, 1865 (45 months). Colored Troops considered from September, 1862, to December, 1867 (63 months).

Compiled from the "Medical History of the Rebellion."

TABLE "d." Strength of the Army at Various Dates, compiled by the Adjutant General of the Army after a thorough Revision of his Records. (Report of Provost Marshal General, page 102.)

DATES.	PRESENT.			ABSENT.			AGGREGATE.		GRAND TOTAL.
	Regulars.	Volunteers.	Total.	Regulars.	Volunteers.	Total.	Regulars.	Volunteers.	
January 1, 1860.....	14,636	.....	14,636	1,799	.....	1,799	16,435	.....	16,435
January 1, 1861.....	14,663	.....	14,663	1,704	.....	1,704	16,367	.....	16,367
July 1, 1861.....	14,108	169,480	183,588	2,314	849	3,163	16,422	170,329	186,751
January 1, 1862.....	19,871	507,333	527,204	2,554	46,159	48,713	22,425	553,492	575,917
March 31, 1862.....	19,585	514,399	533,984	3,723	99,419	103,142	23,308	613,818	637,126
January 1, 1863.....	19,169	679,633	698,802	6,294	213,095	219,389	25,463	892,728	918,191
January 1, 1864.....	17,237	594,013	611,250	7,399	242,088	249,487	24,636	836,101	860,737
January 1, 1865.....	14,661	606,263	620,924	7,358	331,178	338,536	22,019	937,411	959,460
March 31, 1865.....	13,880	643,867	657,747	7,789	314,550	322,339	21,669	958,417	980,086
May 1, 1865.....	.....	.....	797,807	.....	.....	202,709	.....	.....	1,000,516

APPENDIX E (Continued).

TABLE "e." *Statement of Casualties in the Volunteer and Regular Armies of the United States, and the Colored Troops and Independent Organizations, from the Commencement of the Rebellion up to August 1, 1865. (Report of Provost Marshal General, pages 78 and 79.)*

	Officers Killed.	Enlisted Men Killed.	Officers died of Wounds.	Enlisted Men died of Wounds.	Officers died of Disease.	Enlisted Men died of Disease.	Officers Deserted.	Enlisted Men Deserted.	Officers honorably Discharged.	Enlisted Men honorably Discharged.	Officers Discharged for Disability.	Enlisted Men Discharged for Disability.	Officers dishonorably Discharged.	Enlisted Men dishonorably Discharged.	Officers Drained.	Officers Cashiered.	Officers Resigned.	Officers Missing in Action.	Enlisted Men Missing in Action.	Officers accidentally Killed.	Enlisted Men accidentally Killed.	Enlisted Men Executed by Sentence of G. C. M.	Aggregate Casualties.	Number of Men Enlisted during the War in which these Casualties occurred.	Terms of Service from 3 Months to 3 Years.
Total volunteers..	8,345	54,056	1,535	82,095	2,141	152,013	187	170,029	10,805	179,764	3,058	209,102	186	2,023	2,143	252	21,090	72	4,085	12	294	6	828,307	*	
Regular army.....	157	1,890	.....	83	2,749	5	16,360	2	1,01	2	5,089	.....	275	122	6	830	83	1,266	.....	1	29,637	67,000		
Colored troops...	124	1,790	46	1,037	90	26,211	24	12,440	427	2,373	166	6,889	18	191	153	16	801	18	1,275	.....	.....	54,039	180,017	
Grand total..	8,626	57,736	1,641	83,132	2,314	180,973	216	198,829	11,274	183,343	3,226	221,090	204	2,489	2,433	274	22,281	123	6,626	12	294	7	912,048	*	

* Total Volunteers (white) not given. The total number of men furnished by the North during the war (White Volunteers, Regular Troops, and Colored) was 2,670,874. (Vide p. 658, A. G. O., 1876.)

The records of the "Confederate" army are at present not sufficiently complete to tabulate as above.

TABLE "f," *giving the Numbers of Men to be deducted per Thousand of Mean Aggregate Strength for Causes shown (Army being in the Field Campaigning).*

Being in the Field Campaigning.

(Original.)

TROOPS.	CONSTANTS.		Total.	Consequent "Effective Strength" per 1000 of Troops concerned.
	Absent.	Sick in Hospital.		
Regulars.....	226	64	290	710
Volunteers.....	265	89	354	646
White.....	264	86	350	650
Colored.....	158	46	204	796
Mixed.....	258	80.9	338	662

Compiled from "Medical History of the Rebellion," etc.

TABLE "g," *showing the Annual Loss per Thousand of Mean Aggregate Strength actually Enrolled or Engaged, for Various Causes shown (Campaigning, etc.).*

TROOPS.	General Mortality.	Killed in Battle.*	Died of Wounds.	Deserters.	Missing in Action.	Miscellaneous Casualties, Accidents, Executions, etc.	Discharged for Disability.	Honorable Discharges and Resignations.	Dishonorable Exit from the Service.	Grand Total Annual Casualties per 1000 of mean aggregate Strength.
Regulars	47.6	19.9	11.7	178 ±	14.0	1.1 (?)	71.0	15.1	4.3	261.7
Volunteers	75.4	18.9	11.2	57 ±	1.4	1	90.7	64.6	1.5	330.8
White	74.6	18.9	11.2	61 ±	1.8	1.1 (?)	90.1	63.2	1.6	322.5
Colored	176.3	10.6	10.8	74 ±	7.6	1.1 (?)	67.9	21.4	2.2	351.1
Mixed	79.7	18.4	10.8	61 ±	2.0	1	88.2	60.9	1.7	322.8

* "Recent official Russian reports show that only 16½ per cent. of an active army are killed or wounded during a long and exceptionally sanguinary war."—*"Army and Navy Journal,"* May 25, 1879; also Appendix W, Report of Chief of Ordnance, 1879.

TABLE "h." *Number of Men called for, Periods of Service, and Number of Men obtained under Each Call to June 30, 1865.*

				(From Goodrich's "History of the United States.")			
DATE OF CALL.	Number called for.	Periods of Service.	Number obtained.	DATE OF CALL.	Number called for.	Periods of Service.	Number obtained.
April 15, 1861	75,000	3 months.	93,326	October 17, 1863	300,000	} 3 years.	374,807
May 3, 1861	82,748	} 3 years.	714,231	February 1, 1864	200,000		284,021
July 22 and 25, 1861	500,000			March 14, 1864	200,000	3 years.	
May and June, 1862 .....	.....	3 months.	15,007	April 23, 1864	85,000	100 days.	83,652
July 2, 1862	300,000	3 years.	431,958	July 18, 1864	500,000	1, 2, 3 years.	384,882
August 4, 1862	300,000	9 months.	87,588	December 19, 1864	300,000	1, 2, 3 years.	204,568
June 15, 1863	100,000	6 months.	16,361	Totals	2,942,748	.....	2,690,401

The calls of October 17, 1863, and February 1, 1864, were combined, and the product of the draft of July, 1863, was credited thereon.

In addition to the above number, 63,322 men were obtained, chiefly from the Territories and rebellious States, under different calls and for various periods of service. The whole number of men obtained by draft was 168,619. The whole number of colored troops obtained was 186,097.

"After the disasters on the Peninsula in 1862, over 80,000 troops were enlisted, organized, armed, equipped, and sent to the field in less than a month; 60,000 troops repeatedly went to the field within four weeks; 90,000 infantry were sent to the army from the five States of Ohio, Indiana, Illinois, Iowa, and Wisconsin within twenty days."—"Report of Secretary of War."

APPENDIX E (Continued).

TABLE "i." Number of Men furnished by each State and Territory, from April 15, 1861, to June 30, 1865.

(From Goodrich's "History of the United States.")

STATES AND TERRITORIES.	Men Furnished.	Paid Com- mutation.	STATES AND TERRITORIES.	Men Furnished.	Paid Com- mutation.	STATES AND TERRITORIES.	Men Furnished.	Paid Com- mutation.
Maine.....	69,738	2,007	Indiana.....	194,363	784	Oregon.....	1,810	.....
New Hampshire.....	33,913	692	Illinois.....	258,162	55	Washington Territory.....	964	.....
Vermont.....	33,272	1,974	Michigan.....	88,111	2,008	Nebraska Territory.....	3,157	.....
Massachusetts.....	146,467	5,318	Wisconsin.....	91,021	5,097	Colorado Territory.....	4,903	.....
Rhode Island.....	23,248	463	Minnesota.....	24,002	1,032	Dakota Territory.....	206	.....
Connecticut.....	55,755	1,515	Iowa.....	75,793	67	New Mexico Territory.....	6,561	.....
New York.....	445,959	18,197	Missouri.....	108,773	.....	Alabama.....	2,576	.....
New Jersey.....	75,315	4,196	Kentucky.....	75,275	3,265	Florida.....	1,290	.....
Pennsylvania.....	338,155	28,171	Kansas.....	20,095	2	Louisiana.....	5,224	.....
Delaware.....	12,265	1,386	Tennessee.....	31,092	.....	Mississippi.....	545	.....
Maryland.....	46,053	3,678	Arkansas.....	8,289	.....	Texas.....	1,965	.....
West Virginia.....	32,003	.....	North Carolina.....	3,156	.....	Indian Territory.....	3,530	.....
District of Columbia.....	16,534	338	California.....	15,725	.....		
Ohio.....	310,654	6,479	Nevada.....	1,080	.....	Totals.....	2,666,999	86,724

APPENDIX F.

TABLE "a."—Of Fire. Arm: Infantry. Number Firing: 1,000 Men in "Thin Skirmish Order." Time: 1 Minute. Rate of Fire: as Rapid as consistent with Accuracy and Safety, and according to Range. Character of Fire: "Deadly." Target: the Ordinary "Line of Battle," Stationary.

(Original.)

PROJECT- ILE.	Range.	Number of Rounds.	Number of Balls, Frag- ments, etc., per Round.	Consequent Number of Balls, etc., per Piece, etc.	Number of Balls, etc., per Unit Firing.	Per Cent. of Hits.	Resulting Num- ber of Target Hits.	Battle Effect.	REMARKS.
OB- LONG LEADEN PROJECTILE.	Within 100 yards.	12	1	12	12,000	(80 — 30) = 50	6,000	3,000	$\frac{1}{2}$
	100 to 200 yards.	11	1	11	11,000	(79 — 227) = 573	6,303	3,152	$\frac{1}{2}$
	200 to 300 "	10	1	10	10,000	(77 — 154) = 616	6,160	3,080	$\frac{1}{2}$
	300 to 400 "	9	1	9	9,000	(75 — 103) = 647	5,823	2,911	$\frac{1}{2}$
	400 to 500 "	8	1	8	8,000	(73 — 066) = 664	5,312	2,656	$\frac{1}{2}$
	500 to 600 "	7.5	1	7.5	7,500	(71 — 045) = 665	4,988	2,494	$\frac{1}{2}$
	600 to 700 "	7.0	1	7.0	7,000	(68 — 034) = 646	4,522	2,261	$\frac{1}{2}$
	700 to 800 "	6.5	1	6.5	6,500	(64 — 024) = 616	4,004	2,002	$\frac{1}{2}$
	800 to 900 "	6.0	1	6.0	6,000	(61 — 008) = 602	3,612	1,806	$\frac{1}{2}$
	900 to 1,000 "	5.5	1	5.5	5,500	57	3,135	1,567	$\frac{1}{2}$
	1,000 to 1,200 "	5.0	1	5	5,000	(45) $\frac{1}{2}$ = 225	2,550	1,222	$\frac{1}{2}$
	1,200 to 1,600 "	4.5	1	4.5	4,500	(38) $\frac{1}{2}$ = 19	1,013	436	$\frac{1}{2}$
	1,600 to 2,000 "	4	1	4	4,000	(28) $\frac{1}{2}$ = 093	760	278	$\frac{1}{2}$
	2,000 to 2,500 "	3	1	3	3,000	(13) $\frac{1}{2}$ = 043	279	74	$\frac{1}{2}$
	2,500 to 3,000 "	3	1	3	3,000	(01) $\frac{1}{2}$ = 0033	129	32	$\frac{1}{2}$
	3,000 to 4,000 "	3	1	3	3,000		10	2	$\frac{1}{2}$
	Over 4,000 yards.								

TABLE "b."—Of Fire. Arm: Gatling Gun, Cal. 45. Number Firing: 1 Battery of 6 Guns, at 20 Yards' Interval = 100 Yards' Front. Time: 1 Minute. Rate of Fire: as Rapid as consistent with Accuracy and Safety, and according to Range. Character of Fire: "Deadly." Target: the Ordinary "Line of Battle," Stationary.

(Original.)

PROJECT- ILE.	Range.	Number of Rounds.	Number of Balls, Frag- ments, etc., per Round.	Consequent Number of Balls, etc., per Piece, etc.	Number of Balls, etc., per Unit Firing.	Per Cent. of Hits.	Resulting Number of Target Hits.	Battle Effect.	REMARKS.
OB- LONG LEADEN PROJECTILE.	Within 100 yards.	400	1	400	2,400	96	2,304	205	$\frac{5}{8}$
	100 to 200 yards.	380	1	380	2,280	95	2,166	433	$\frac{1}{2}$
	200 to 300 "	350	1	350	2,100	94	1,974	502	$\frac{1}{2}$
	300 to 400 "	320	1	320	1,920	92	1,766	571	$\frac{1}{2}$
	400 to 500 "	300	1	300	1,800	90	1,620	640	$\frac{1}{2}$
	500 to 600 "	280	1	280	1,680	88	1,478	709	$\frac{1}{2}$
	600 to 700 "	260	1	260	1,560	85	1,326	663	$\frac{1}{2}$
	700 to 800 "	240	1	240	1,440	82	1,180	590	$\frac{1}{2}$
	800 to 900 "	220	1	220	1,320	79	1,042	521	$\frac{1}{2}$
	900 to 1,000 "	200	1	200	1,200	75	900	450	$\frac{1}{2}$
	1,000 to 1,200 "	"	1	"	"	71	852	411	$\frac{1}{2}$
	1,200 to 1,600 "	"	1	"	"	66	792	343	$\frac{1}{2}$
	1,600 to 2,000 "	"	1	"	"	59	708	259	$\frac{1}{2}$
	2,000 to 2,500 "	"	1	"	"	49	588	157	$\frac{1}{2}$
	2,500 to 3,000 "	"	1	"	"	34	408	102	$\frac{1}{2}$
	3,000 to 4,000 "	"	1	"	"	21	252	56	$\frac{1}{2}$
	Over 4,000 yards.	"	1	"	"	08	36	6	$\frac{1}{2}$

APPENDIX F (Continued).

TABLE "c."—Of Fire. Arm: 12-Pdr. Number Firing: 1 Battery of 6 Guns. Time: 1 Minute. Rate of Fire: as Rapid as consistent with Accuracy and Safety, and according to Range. Character of Fire: "Deadly." Target: the Ordinary "Line of Battle," Stationary.

(Original.)

PROJECT-ILE.	Range.	Number of Rounds.	Number of Balls, Fragments, etc., per Round.	Consequent Number of Balls, etc., per Piece, etc.	Number of Balls, etc., per Unit Firing.	Per Cent. of Hits.	Resulting Number of Target Hits.	Battle Effect.	REMARKS.
DOUBLE CANISTER.	Within 200 yards.	3	60	180	1,080	.50	540	180	$\frac{1}{3}$
SINGLE CANISTER.	100 to 200 yards.	3	30	90	540	.50	270	125	$\frac{5}{12} +$
	200 to 300 "	3	30	90	540	.40	216	96	$\frac{1}{3} +$
	300 to 400 "	3	30	90	540	.20	108	36	$\frac{1}{3}$
	400 to 600 "	3	30	90	540	.05	27	5	$\frac{1}{3}$
CASE-SHOT.	Within 300 yards.	2	80	160	960	.40	384	77	$\frac{1}{3}$
	300 to 500 yards.	2	80	160	960	.45	432	120	$\frac{1}{12}$
	500 to 800 "	2	80	160	960	.55	528	176	$\frac{1}{3}$
	800 to 1,000 "	2	80	160	960	.65	624	208	$\frac{1}{3}$
	1,000 to 1,200 "	2	80	160	960	.60	576	192	$\frac{1}{3}$
	1,200 to 1,600 "	1 $\frac{1}{2}$	80	120	720	.40	288	96	$\frac{1}{3}$
	1,600 to 2,000 "	1	80	80	480	.25	195	52	$\frac{1}{12}$
	2,000 to 2,500 "	1	80	80	480	.05	24	6	$\frac{1}{3}$
TIME SHELL.	Within 300 yards.	2	14	28	168	.40	67	12	$\frac{5}{12}$
	300 to 500 yards.	2	14	28	168	.45	76	20	$\frac{1}{12}$
	500 to 800 "	2	14	28	168	.50	84	28	$\frac{1}{3}$
	800 to 1,200 "	2	14	28	168	.55	92	31	$\frac{1}{3}$
	1,200 to 1,400 "	2	14	28	168	.45	76	20	$\frac{1}{12}$
	1,400 to 1,600 "	1 $\frac{1}{2}$	14	21	126	.25	32	9	$\frac{1}{3}$
	1,600 to 2,000 "	1	14	14	84	.05	4	1	$\frac{1}{6}$

TABLE "d."—Of Fire. Arm: 3" Rifle. Number Firing: 1 Battery of 6 Guns. Time: 1 Minute. Rate of Fire: as Rapid as consistent with Accuracy and Safety, and according to Range. Character of Fire: "Deadly." Target: the Ordinary "Line of Battle," Stationary.

(Original.)

PROJECT-ILE.	Range.	Number of Rounds.	Number of Balls, Fragments, etc., per Round.	Consequent Number of Balls, etc., per Piece, etc.	Number of Balls, etc., per Unit Firing.	Per Cent. of Hits.	Resulting Number of Target Hits.	Battle Effect.	REMARKS.
DOUBLE CANISTER.	Within 100 yards.	3	200	600	3,600	.40	1,440	240	$\frac{1}{6}$
SINGLE CANISTER.	100 to 200 yards.	3	150	450	2,700	.40	1,080	216	$\frac{1}{3}$
	200 to 300 "	3	150	450	2,700	.30	810	175	$\frac{1}{3}$
	300 to 400 "	3	150	450	2,700	.10	270	68	$\frac{1}{3}$
	400 to 600 "	3	150	450	2,700	.025	70	10	$\frac{1}{3}$
CASE-SHOT.	Within 300 yards.	2	52	104	604	.45	272	54	$\frac{1}{3}$
	300 to 500 yards.	2	52	104	604	.55	332	93	$\frac{1}{12}$
	500 to 800 "	2	52	104	604	.65	392	131	$\frac{1}{3}$
	800 to 1,200 "	2	52	104	604	.75	453	151	$\frac{1}{3}$
	1,200 to 1,600 "	2	52	104	604	.65	392	131	$\frac{1}{3}$
	1,600 to 2,000 "	1 $\frac{1}{2}$	52	78	468	.50	234	78	$\frac{1}{3}$
	2,000 to 3,000 "	1	52	52	312	.35	109	30	$\frac{1}{12}$
	3,000 to 4,000 "	$\frac{1}{2}$	52	26	156	.15	24	6	$\frac{1}{3}$
	4,000 to 5,000 "	$\frac{1}{2}$	52	17	102	.10	10	2	$\frac{1}{3}$
	Over 5,000 yards.	$\frac{1}{2}$	52	13	78	.05	4	.5	$\frac{1}{3}$
PERCUSSION SHELL.	Within 300 yards.	2	9	18	108	.88	95	16	$\frac{1}{3}$
	300 to 500 yards.	2	9	18	108	.79	85	21	$\frac{1}{3}$
	500 to 800 "	2	9	18	108	.72	78	26	$\frac{1}{3}$
	800 to 1,200 "	2	9	18	108	.60	65	23	$\frac{1}{3}$
	1,200 to 1,600 "	2	9	18	108	.50	54	18	$\frac{1}{3}$
	1,600 to 2,000 "	2	9	18	108	.40	43	14	$\frac{1}{3}$
	2,000 to 3,000 "	1 $\frac{1}{2}$	9	13 $\frac{1}{2}$	81	.30	24	8	$\frac{1}{3}$
	3,000 to 4,000 "	1	9	9	54	.15	8	2.5	$\frac{1}{3}$
	4,000 to 5,000 "	$\frac{1}{2}$	9	4 $\frac{1}{2}$	27	.10	3	.75	$\frac{1}{3}$
	Over 5,000 yards.	$\frac{1}{2}$	9	3	18	.05	1	.16	$\frac{1}{3}$

APPENDIX F (Continued).

TABLE "e."—Of Fire. Arm: Hotchkiss's Revolving Cannon, Cal. 1½". Number Firing: 1 Battery of 6 Guns, at 30 Yards' Interval = 150 Yards' Front. Time: 1 Minute. Rate of Fire: as Rapid as consistent with Accuracy and Safety, and according to Range. Character of Fire: "Deadly." Target: the Ordinary "Line of Battle," Stationary.

(Original.)

PROJECT-ILE.	Range.	Number of Rounds.	Number of Balls, Fragments, etc., per Round.	Consequent Number of Balls, etc., per Piece, etc.	Number of Balls, etc., per Unit Firing.	Per Cent. of Hits.	Resulting Number of Target Hits.	Battle Effect.	REMARKS.
PERCUSSION SHELL.	Within 100 yards.	80	8	640	3,840	94	3,609	123	1/3 +
	100 to 200 yards.	78	8	624	3,744	92	3,444	230	1/3 +
	200 to 300 "	75	8	600	3,600	90	3,240	328	1/3 +
	300 to 400 "	72	8	576	3,456	87	3,006	428	1/3 +
	400 to 500 "	72	8	560	3,360	84	2,822	526	1/3 +
	500 to 600 "	68	8	544	3,264	81	2,643	588	1/3 +
	600 to 700 "	66	8	528	3,168	78	2,471	617	1/3 +
	700 to 800 "	64	8	512	3,072	74	2,273	634	1/3 +
	800 to 900 "	62	8	496	2,976	70	2,083	652	1/3 +
	900 to 1,000 "	60	8	480	2,880	65	1,872	624	1/3 +
	1,000 to 1,200 "	60	8	480	2,880	62	1,785	595	1/3 +
	1,200 to 1,600 "	60	8	480	2,880	55	1,584	528	1/3 +
	1,600 to 2,000 "	60	8	480	2,880	49	1,411	470	1/3 +
	2,000 to 2,500 "	60	8	480	2,880	42	1,209	345	1/3 +
	2,500 to 3,000 "	60	8	480	2,880	29	835	221	1/3 +
	3,000 to 4,000 "	60	8	480	2,880	18	518	129	1/3 +
	4,000 to 5,000 "	60	8	480	2,880	06	172	38	1/3 +
	Over 5,000 yards.	60	8	480	2,880	02	57	9	1/3 +

TABLE "f."—Of Fire. Table showing Relative Exposure of a Company in Line and Column, at Various Ranges. (Rifle Mauser.)

(From "Prussian Musketry Instructions," 1877.)

SIGHT USED.	PERCENTAGE OF HITS ON				REMARKS.
	Company in Line, Standing.	Company in Column, Standing.	Company in Line, Lying.	Company in Column, Lying.	
Yards.					
444	50 to 70	60 to 80	15 to 20	25 to 30	At the shorter ranges the Column does not suffer much more than the Line, both standing. At 800 yards its loss is double that of the Line, while in the lying position at this range it is three times that of the Line, the proportion being less at the shorter ranges.
777	18 to 35	30 to 45	4 to 10	12 to 25	
1555	4 to 10	10 to 14	1 to 3	4 to 8	

TABLE "g."—Of Fire. Table showing Results of Firing at Unknown Ranges, at Bruch, in 1875-'76. (Rifle Werndl.)

NATURE OF FIRE.	Range, Yards.	OBJECT FIRED AT.	Hits (per Cent.).	REMARKS.
Individual.	500	Front of a company, 128 figures, 6 feet high..	26	Distances judged by squads themselves.
	660	" " " ..	24	
	830	" " " ..	13	
	830	Do. 2 feet high.....	12	
	500	Company Column. | } + 6'	63	
	660	45' 0" | 62'	50	
	830	| 62'	24	
Volley.	830	Do. but 3 feet high.....	26	
Individual.	1210	Double Column of Battalion. | } + 6'	67.3	Range approximately known.
		120' | 120'		

APPENDIX F (Continued).

TABLE "h."—Of Fire. Showing the Result of Austrian Field-firing in 1877. (Rounds fired, 674,000.)

RANGE (YARDS).	PERCENTAGE OF HITS.						General Percentage of all Kinds of Fire.	REMARKS.
	SQUADS.			COMPANY, WAR STRENGTH.				
	Volleys (Close Order).	Volleys of Groups, in Open Order.	Individual, in Open Order.	Individual, in Close Order.	CLOSE ORDER.			
					Volleys.	Individual.		
660 to 710	38	44	40.2	Target—a rectangle repre- senting double column of bat- talions, 120' x 120' x 6'.
750 to 800	41	33	34	43	34	29	....
920 to 960	34	32	..	34	29	..	....
1,000 to 1,040	33	..	28	34	26	44	32	
1,170 to 1,210	30	23	27	26	22	21	24.8	

In the combat firing, advancing from 1,170 to 660 yards and retiring the same distance, the squads made 32 and the companies 30 per cent. of hits on the double columns of battalions, 120 x 120 (Ranges judged).

AUSTRIAN FIELD-FIRING AT RATTSDORF, 1877.—2 Battalions (743 men) advanced from 1,170 yards to 250 yards from the targets in 1 hour and 25 minutes. An average of 36 rounds was found sufficient. Total, 22,000 rounds fired. The targets were 500 feet (in detached lengths) of skirmishers, 2' high.

3 groups of supports, each 63' x 3' high.

3 " " reserves, " 55' x 5' 6" high and less.

The skirmishers were much hid by trees; the reserves only appeared for from 5 to 10 seconds in 2 or 3 minutes, and were then hid. Hits were made: on shooting line, 221; supports, 1,196; reserves, 163, or 7.2 per cent. Some squads in dominant positions fired over the heads of the advancing troops without inconvenience. None of the ranges were known.

BERDAN RIFLE.—With the Berdan, 49 per cent. of hits at 1,166 yards with picked shots, and 18 per cent. with recruits, fresh from a march, have been made this year (1879), on targets screened by a 7' parapet.

Against a battalion column target 90' x 90', 8 per cent. of hits were made this year (1879), at 3,100 yards (known) range.

MARTINI-HENRY RIFLE.—With th Martini-Henry a rectangle of 100' by 4' has been found to catch 33 per cent. of shots at 2,000, and 65 per cent. at 1,500 yards.

TABLE "i." First Period. From the Introduction of Firearms to the Invention of the Iron Ramrod and Bayonet.

(" United Service Magazine.")

BATTLE.	Date.	Engaged.	Total.	Casualties.	Total.	Per Cent.
Leipsic.....	1631	{ 40,000 Imperialists..... }	61,850	{ 11,000 }	13,700	22
		{ 21,850 Swedes..... }		{ 2,700 }		
		{ 31,000 Imperialists..... }		{ 7,000 }		
Lutzen.....	1632	{ 20,000 Swedes..... }	51,000	{ 11,000 }	16,000	35
		{ 45,000 Imperialists..... }		{ 2,000 }		
Nordlingen.....	1634	{ 24,000 Swedes..... }	69,000	{ 12,000 }	14,000	20
		{ 22,000 French..... }		{ 4,000 }		
Rocroy.....	1643	{ 27,000 Spanish..... }	49,000	{ 13,000 }	17,000	35
		{ 25,000 Parliament..... }				
Marston Moor.....	1644	{ 22,000 Royalist..... }	47,000	.....	7,500	16
		{ 10,000 Parliament..... }				
Naseby.....	1645	{ 10,000 Royalist..... }	20,000	{ 1,500 }	3,700	18
		{ 60,000 Allies..... }		{ 2,200 }		
Seneff.....	1674	{ 48,000 French..... }	108,000	.....	37,000	34

Average Percentage of Casualties for the Period, 26.

TABLE "j." Second Period. That of the Old "Brown Bess," with the Bayonet.

(" United Service Magazine.")

BATTLE.	Date.	Engaged.	Total.	Casualties.	Total.	Per Cent.
Hohenfriedberg.....	1745	{ 70,000 Prussians..... }	140,000	{ 5,000 }	14,000	10
		{ 70,000 Austrians..... }		{ 9,000 }		
Fontenoy.....	1745	{ 56,000 French..... }	106,000	{ 5,000 }	12,000	11
		{ 50,000 English and Austrians..... }		{ 7,000 }		
Leuthen.....	1757	{ 30,000 Prussians..... }	110,000	{ 6,260 }	16,260	15
		{ 80,000 Austrians..... }		{ 10,000 }		
Kolin.....	1757	{ 60,000 Austrians..... }	94,000	{ 8,114 }	18,887	20
		{ 34,000 Prussians..... }		{ 10,773 }		
Hochkirch.....	1758	{ 90,000 Austrians..... }	130,000	{ 6,000 }	14,000	11
		{ 40,000 Prussians..... }		{ 8,000 }		
Zorndorf.....	1758	{ 32,000 Prussians..... }	82,000	{ 11,358 }	32,889	40
		{ 50,000 Russians..... }		{ 21,531 }		
Sillery Wood.....	1760	{ 3,100 English..... }	9,100	{ 1,000 }	3,000	33
		{ 6,000 French..... }		{ 2,000 }		
Marengo.....	1800	{ 28,127 French..... }	58,977	{ 7,000 }	13,800	23
		{ 30,850 Austrians..... }		{ 6,800 }		
Austerlitz.....	1805	{ 90,000 French..... }	170,000	{ 12,000 }	32,000	19
		{ 80,000 Allies..... }		{ 20,000 }		
Jena and Auerstädt.....	1806	{ 100,000 French..... }	200,000	{ 14,000 }	34,000	17
		{ 100,000 Prussians..... }		{ 20,000 }		

APPENDIX F (Continued).

TABLE "j" (Continued).

BATTLE.	Date.	Engaged.	Total.	Casualties.	Total.	Per Cent.
Eylau.....	1807	{ 80,000 French..... }	155,000	{ 30,000 }	55,000	35
		{ 75,000 Russians..... }		{ 25,000 }		
Talavera.....	1809	{ 49,000 English and Spanish..... }	96,000	{ 6,268 }	13,457	14
		{ 47,000 French..... }		{ 7,189 }		
Wagram.....	1809	{ 150,000 French..... }	280,000	.....	24,000	8-9
		{ 130,000 Austrians..... }				
Albuera.....	1811	{ 32,000 English and Spanish..... }	55,000	{ 7,000 }	15,000	27
		{ 23,000 French..... }		{ 8,000 }		
Borodino.....	1812	{ 133,000 French..... }	265,000	{ 50,000 }	95,000	36
		{ 132,000 Russians..... }		{ 45,000 }		
Leipsic (3 days).....	1813	{ 290,000 Allies..... }	465,000	{ 47,804 }	97,804	21
		{ 175,000 French..... }		{ 50,000 }		
Vittoria.....	1813	{ 80,000 English and Spanish..... }	140,000	{ 5,176 }	10,676	8
		{ 60,000 French..... }		{ 5,500 }		
Lundy's Lane.....	1814	{ 5,000 British..... }	9,200	{ 860 }	1,738	19
		{ 4,200 Americans..... }		{ 878 }		
Kunersdorf.....	1759	{ 90,000 Austrians and Russians..... }	130,000	{ 18,000 }	37,000	29
		{ 40,000 Prussians..... }		{ 19,000 }		
Bunker's Hill.....	1775	{ 3,200 British..... }	5,900	{ 1,016 }	1,457	24
		{ 2,700 Americans..... }		{ 441 }		
Friedland.....	1807	{ 80,000 French..... }	135,000	{ 10,000 }	27,000	20
		{ 55,000 Russians..... }		{ 17,000 }		
Bautzen.....	1813	{ 150,000 French..... }	240,000	{ 19,000 }	34,000	14
		{ 90,000 Allies..... }		{ 15,000 }		

Average Percentage of Casualties for the Period, 20½.

TABLE "k." Third Period. Rifled Barrels and Percussion Caps.

("United Service Magazine.")

BATTLE.	Date.	Engaged.	Total.	Casualties.	Total.	Per Cent.
Alma.....	1854	{ 63,000 Allies..... }	102,000	{ 3,602 }	9,311	9
		{ 39,000 Russians..... }		{ 5,709 }		
Magenta.....	1859	{ 48,090 French..... }	109,730	{ 4,000 }	9,700	9
		{ 61,640 Austrians..... }		{ 5,700 }		
Solferino.....	1859	{ 135,230 French..... }	298,350	{ 14,415 }	27,435	9
		{ 163,120 Austrians..... }		{ 13,020 }		
Shiloh.....	1862	{ 40,000 Union..... }	80,000	{ 9,617 }	19,357	24
		{ 40,000 Confederate..... }		{ 9,740 }		
Chickahominy (7 days).....	1862	{ 105,000 Union..... }	193,000	{ 12,291 }	29,121	15
		{ 88,000 Confederate..... }		{ 16,830 }		
Antietam.....	1862	{ 87,164 Union..... }	122,519	{ 11,426 }	20,426	16
		{ 35,355 Confederate..... }		{ 9,000 }		
Fredericksburg.....	1862	{ 100,000 Union..... }	178,000	{ 10,203 }	14,764	8
		{ 78,000 Confederate..... }		{ 4,556 }		
Chancellorsville.....	1862	{ 132,000 Union..... }	190,000	{ 11,030 }	21,311	11
		{ 58,000 Confederate..... }		{ 10,281 }		
Gettysburg.....	1863	{ 105,000 Union..... }	167,000	{ 16,543 }	34,543	20
		{ 62,000 Confederate..... }		{ 18,000 }		
Murfreesboro'.....	1862	{ 43,000 Union..... }	76,475	{ 8,778 }	17,778	23
		{ 33,475 Confederate..... }		{ 9,000 }		
Chickamauga.....	1863	{ 50,000 Union..... }	95,000	{ 10,906 }	26,706	28
		{ 45,000 Confederate..... }		{ 15,800 }		

Average Percentage of Casualties for the Period, 15.

TABLE "l." Fourth Period. First Appearance of the Breech-Loader, which was Used by Both Sides, except at Königgrätz, where the Prussians only were Armed with it.

("United Service Magazine.")

BATTLE.	Date.	Engaged.	Total.	Casualties.	Total.	Per Cent.
Königgrätz.....	1866	{ 230,000 Prussians..... }	415,000	.....	28,000	7
		{ 185,000 Austrians..... }				
Wörth.....	1870	{ 90,000 Prussians..... }	130,000	{ 10,530 }	18,030	14
		{ 40,000 French..... }		{ 7,500 }		
Spicheren.....	1870	{ 41,000 Prussians..... }	79,000	{ 4,900 }	8,900	11
		{ 38,000 French..... }		{ 4,000 }		
Mars-le-Tour.....	1870	{ 60,000 Prussians..... }	200,000	{ 14,900 }	31,800	16
		{ 140,000 French..... }		{ 16,900 }		
Gravelotte.....	1870	{ 270,000 Prussians..... }	405,000	{ 20,000 }	36,000	9
		{ 135,000 French..... }		{ 16,000 }		
Sedan.....	1870	{ 220,000 Prussians..... }	343,000	{ 10,000 }	37,000	8-9
		{ 123,000 French..... }		{ 17,000 }		

APPENDIX G.

TABLE "a." *An Ideal Table, showing the Military Forces of the United States, arranged in the General Order in which in Case of Need they may be called out in the National Defense.*

Authorities: "United States Regulations," "Army Register," "General Statutes," "State National Guard Reports," etc.

(Original)

1. <i>The Regular Army...</i>	{ A "standing" national organization, the officers commissioned indefinitely, non-commissioned officers and privates enlisted for a definite period. Limited in numbers, and subject to military law or the "Articles of War," etc., 30,000 men.
2. <i>The Volunteer Militia "National Guards."</i>	{ Also a "standing" body, but of State organizations, voluntarily enlisted for a definite period during peace; armed, and somewhat allowed by the General Government; limited in numbers by State legislation, and subject to the "Articles of War" only when called out constitutionally by the President. About 150,000 men.
3. <i>Volunteers.....</i>	{ "Special troops" called for by the President, raised and equipped by the States <i>pro rata</i> . Subject to the "Articles of War" after being mustered; maintained by the General Government, and limited only by demand and possibility of voluntary enlistment. Say, perhaps, 1,250,000 men.
4. <i>Drafted Militia.....</i>	{ "Special troops" called for by the President, apportioned through the several States for draft, and so selected from unexempt able-bodied male citizens between 18 and 45 years of age. When drafted, they are equipped, mustered, and maintained in the same manner as other State troops. Number, perhaps, 2,500,000 men.
5. <i>Levee in Mass.....</i>	{ The final effort of the people in response to the most imperative call of the Executive to drive invaders from the soil. This puts the total remaining available strength (no exemption) under arms, and might be little short of some 4,000,000 men.
<i>Total available Military Strength.</i>	{ 6,900,000 to 8,000,000 men, or about $\frac{1}{4}$ th of the population.

TABLE "b." *The Regular Army of the United States, 30,000 Men. The National "Cadre" and Model for all other Military Organizations.*

See "Revised Statutes," "Army Register," Regulations and General Orders, A. G. O.

(Original)

COMMANDER-IN-CHIEF.....	{ The President of the United States, Washington, D. C., assisted by the Secretary of War. War Department and Headquarters of the Army, Washington, D. C.
GENERAL STAFF..	GENERAL OFFICERS..... { 1 General. In command of army. 1 Lieutenant General. } Divisions and Departments. Headquarters at principal posts and cities. Assisted by 29 Aides. 3 Major Generals. 6 Brigadier Generals.
	THE STAFF DEPARTMENTS..... { 17 Adjutant Generals. Orders and official business. 5 Inspector Generals. General supervision. 57 Quartermasters. Transportation, quarters, and fuel. 26 in Subsistence Department. Food and rations, etc. 378 in Medical Department. { 192 Commissioned Officers. } Sanitary, etc. 186 Non-Commissioned Officers. 55 in Pay Department. Remuneration and mileage. 5 in Bureau of Military Justice. Military Law and Courts Martial. 455 in Signal Department. { 5 Commis'd Officers. } Commerce, Agriculture, and Dispatches. 450 Enlisted Men. } School at Fort Foot, Maryland.
	ENGINEERS: 309 { 109 Commissioned Officers..... } Staff and Battalion. Military and Civil Engineering. School at Willet's Point, New York. 200 Enlisted Men. } Stations scattered.
STAFF CORPS.....	ORDNANCE: 454 { 54 Commissioned Officers..... } Staff and enlisted men. Arms and munitions of war, equipments, repairs, etc. Stationed at 400 Enlisted Men..... } arsenals, etc.
THE LINE.....	ARTILLERY: 2,880 { 280 Commissioned Officers..... } 5 Regiments, 55 Companies Heavy and 5 Companies Light, stationed along the coast at permanent forts, etc. 30 Officers as Professors of Military Science and Tactics at Military Colleges. School at Fortress Monroe, Virginia. 2,600 Enlisted Men..... }
	INFANTRY: 12,962 { 877 Commissioned Officers..... } 25 Regiments, 250 Companies, stationed along the Lakes, on the Plains, etc., generally on Indian service. No school. 12,085 Enlisted Men..... }
	CAVALRY: 8,882 { 432 Commissioned Officers..... } 10 Regiments, 120 Companies, stationed on Plains, etc. Indian service. No school. 8,450 Enlisted Men..... }
UNITED STATES CORPS CADETS, 321.....	Military Academy, West Point, New York. Professional studies.
NATIONAL COLLEGE CADETS, 3,000.....	Located in various States. Unorganized and undeveloped. Government patronage needed.
NON-COMMISSIONED STAFF, 261.	
INDIAN SCOUTS, 300.	
ENLISTED MEN UNATTACHED, 518.	
RETIRED OFFICERS, 400.	

APPENDIX G (Continued).

TABLE "c." *List of Officers who have commanded the Army since 1775, with the Dates of Command, as far as can be ascertained from the Official Reports.*

("American Almanac." Specially revised by Major Asa Bird Gardner, J. A.)

Major General George Washington, June 15, 1775, to December 23, 1783.	Brigadier General James Wilkinson, June, 1800, to January, 1812.
Major General Henry Knox, December 23, 1783, to June 20, 1784.	Major General Henry Dearborn, January 27, 1812, to June, 1815.
Captain and Brevet Major John Doughty,* June 20, 1784, to August 12, 1784.	Major General Jacob Brown, June, 1815, to February 21, 1828.
Lieutenant Colonel Commandant Josiah Harmar, Brigadier General by brevet, August 12, 1784, to March 4, 1791.	Major General Alexander Macomb, May 24, 1828, to June, 1841.
Major General Arthur St. Clair, March 4, 1791, to March, 1792.	Major General Winfield Scott (Brevet Lieutenant General), June, 1841, to November 1, 1861.
Major General Anthony Wayne, April 11, 1792, to December 15, 1796.	Major General George B. McClellan, November 1, 1861, to March 11, 1862.
Brigadier General James Wilkinson, December 15, 1796, to July, 1798.	Major General Henry W. Halleck, July 11, 1862, to March 12, 1864.
Lieutenant General George Washington, July 3, 1798, to his death, December 14, 1799.	Lieutenant General Ulysses S. Grant, March 12, 1864, to July 25, 1866, and as General to March 4, 1869.
Major General Alexander Hamilton, December 14, 1799, to June 1, 1800.	General William T. Sherman since March 4, 1869.

* At this period the entire army consisted of a small corps of Artillery: 59 officers and men at West Point, New York, and 26 officers and men at Fort Pitt.

TABLE "d." *General Officers at present (1880) in the Service.*

		Entered the Army.
General of the Army.....	William T. Sherman.....	1840
Lieutenant General.....	Philip H. Sheridan.....	1853
	Winfield S. Hancock.....	1844
Major Generals (limited by law to three).....	John M. Schofield.....	1853
	Irvin McDowell.....	1838
	John Pope.....	1842
	Oliver O. Howard.....	1854
	Alfred H. Terry.....	1865
Brigadier Generals (limited by law to six).....	Edward O. C. Ord.....	1839
	Christopher C. Augur.....	1843
	George Crook.....	1852

TABLE "e." *The Strength of the Regular Army of the United States, from 1789 to 1879, as fixed by Acts of Congress.**

("American Almanac.")

YEAR.		Strength of Army.
1789	1 Regiment of Infantry, 1 Battery of Artillery.....	840
1792	Indian Border Wars.....	5,120
1794	Peace establishment.....	3,629
1801	.....	5,144
1807	.....	3,278
1810	.....	7,164
1812	War with Great Britain.....	11,831
1815	.....	9,413
1817-1821	Peace establishment.....	9,980
1822-1832	" ".....	6,184
1833-1837	" ".....	7,198
1838-1842	Florida War.....	12,539
1843-1846	Peace establishment.....	8,613
1847	Mexican War.....	17,812
1848	" ".....	30,890
1849-1855	Peace establishment.....	10,320
1856-1861	" ".....	12,931
1862	Civil War.....	39,273
1863-1866	" ".....	43,332
1867	Peace establishment.....	54,641
1868-1869	" ".....	52,922
1870	" ".....	37,313
1871	" ".....	35,353
1872-1874	" ".....	32,264
1875-1879†	" ".....	27,489

* See Ex. Doc. 23, 45th Congress, Extra Session. The figures are for the aggregate of Officers and Men.

† The number of Privates discharged during the fiscal year 1879 was 4,710; number died during same period, 289; number deserted, 1,965; number enlisted and reenlisted, 7,334.

APPENDIX G (Continued).

TABLE "f." Abstract of the *Militia Force of the United States (organized and unorganized)*, according to the *Latest Returns* received at the *Office of the Adjutant General, 1880.*

("Army Register.")

STATES.	YEARS.	ORGANIZED STRENGTH.						Aggregate.	Number of Men available for Military Duty (unorganized).
		General Officers.	General Staff Officers.	Regimental, Field, and Staff Officers.	Company Officers.	Total Commissioned.	Total Non-Commissioned Officers, Musicians, Privates, etc.		
Maine.....	1878	1	10	9	41	61	814	875	78,458
New Hampshire.....	1879	1	8	27	107	143	1,805	1,948	48,770
Vermont.....	1879	1	14	12	38	65	605	670	44,366
Massachusetts.....	1879	2	17	95	215	329	3,699	4,028	225,461
Rhode Island.....	1878	4	35	76	99	214	1,764	1,978	42,969
Connecticut.....	1879	7	15	37	134	193	2,895	3,088	73,961
New York.....	1879	19	205	264	851	1,339	18,941	20,280	567,669
New Jersey.....	1878	3	35	67	130	235	2,968	3,223	248,127
Pennsylvania.....	1879	6	56	174	451	687	9,063	9,750	422,371
Delaware.....	1879	3	4	1	6	14	76	90	24,073
Maryland.....	1879	1	8	6	66	81	1,164	1,245	89,344
Virginia.....	1879	1	1	22	161	185	2,450	2,635	* 215,200
West Virginia.....	1879	..	..	..	..	..	..	..	* 100,000
North Carolina.....	1879	7	18	41	196	262	2,521	2,783	* 200,000
South Carolina.....	1879	16	162	67	748	993	10,812	11,805	* 95,856
Georgia.....	1879	..	..	..	..	..	..	..	* 180,000
Florida.....	1878	8	50	100	215	373	5,130	5,503	25,903
Alabama.....	1879	..	..	..	..	..	..	..	* 170,000
Mississippi.....	1879	7	2	..	..	9	..	9	135,178
Louisiana.....	1879	5	5	47	149	206	2,551	2,757	137,973
Texas.....	1879	1	1	1	84	87	1,119	1,206	* 150,000
Arkansas.....	1877	14	32	197	710	953	15,424	16,377	* 100,000
Kentucky.....	1879	..	1	4	43	48	674	722	218,000
Tennessee.....	1876	1	6	..	72	79	1,205	1,284	239,564
Ohio.....	1879	1	16	114	400	531	7,843	8,374	500,000
Indiana.....	1879	..	8	..	72	80	1,464	1,544	320,546
Michigan.....	1879	5	12	23	71	111	1,688	1,799	* 300,000
Illinois.....	1879	3	51	107	387	548	6,846	7,394	* 350,000
Missouri.....	1879	1	4	5	67	77	1,270	1,347	* 300,000
Wisconsin.....	1879	3	6	5	78	92	1,732	1,824	* 250,000
Minnesota.....	1879	1	3	1	8	13	191	204	* 120,000
Iowa.....	1877	1	11	50	269	331	4,250	4,581	197,456
Nebraska.....	1879	1	1	..	36	38	658	696	46,000
Kansas.....	1879	5	5	11	106	127	1,920	2,047	121,070
Nevada.....	1879	..	..	..	..	..	..	..	* 20,000
Oregon.....	1878	3	24	..	32	59	582	641	14,878
California.....	1879	7	88	42	120	257	2,340	2,597	114,565
Colorado.....	1878	6	7	..	36	49	553	602	21,000
District of Columbia.....	1879	..	..	..	..	..	..	..	* 15,000
TERRITORIES.									
Arizona.....	1879	..	..	..	..	..	..	..	* 3,500
Dakota.....	1879	..	..	..	..	..	..	..	13,847
Idaho.....	1879	..	..	..	..	..	..	..	* 4,000
Montana.....	1879	..	..	..	..	..	..	..	* 5,500
New Mexico.....	1879	..	..	..	..	..	..	..	* 11,500
Utah.....	1879	..	..	..	..	..	..	..	* 15,000
Washington.....	1879	..	..	..	..	..	..	..	* 9,000
Wyoming.....	1879	..	..	..	..	..	..	..	* 4,000
Grand aggregate.....	....	145	921	1,605	6,198	8,869	117,037	125,906	6,598,105

* Estimated in the Adjutant General's Office.

TABLE "g." Pay allowed by Law to Officers of the Army.

("Army Register.")

GRADE.	PAY OF OFFICERS IN ACTIVE SERVICE.*						PAY OF RETIRED OFFICERS.*					
	Yearly Pay.	MONTHLY PAY.					Yearly Pay.	MONTHLY PAY.				
		Prior to 5 Years' Service.	5 Years' Service.	10 Years' Service.	15 Years' Service.	20 Years' Service.		Prior to 5 Years' Service.	5 Years' Service.	10 Years' Service.	15 Years' Service.	20 Years' Service.
General.....	\$13,500 00	\$1,125 00	10 per ct.	20 per ct.	30 per ct.	40 per ct.	.....	.....	.....	.....	.....	.....
Lieutenant General.....	11,000 00	916 67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Major General.....	7,500 00	625 00	.....	.....	.....	.....	\$5,625 00	\$468 75	.....	.....	.....	.....
Brigadier General.....	5,500 00	458 33	.....	.....	.....	.....	4,125 00	343 75	.....	.....	.....	.....
Colonel.....	3,500 00	291 67	\$320 83	\$350 00	†\$375 00	\$375 00	2,625 00	218 75	\$240 62	\$262 50	\$281 25	\$281 25
Lieutenant Colonel.....	3,000 00	250 00	275 00	300 00	325 00	†333 33	2,250 00	187 50	206 25	225 00	243 75	250 00

* For law establishing the present rates of pay, see Sections 1261, 1262, 1263, and 1274, Revised Statutes.

† The maximum pay of a Colonel is by law \$4,500 per annum; hence, full 40 per cent. can not accrue. [Section 1267, Revised Statutes.]

‡ The maximum pay of a Lieutenant Colonel is by law \$4,000 per annum; hence, full 40 per cent. can not accrue. [Section 1267, Revised Statutes.]

APPENDIX G (Continued).

TABLE "g" (Continued).

GRADE.	PAY OF OFFICERS IN ACTIVE SERVICE.						PAY OF RETIRED OFFICERS.					
	Yearly Pay.	MONTHLY PAY.					Yearly Pay.	MONTHLY PAY.				
		Prior to 5 Years' Service.	5 Years' Service.	10 Years' Service.	15 Years' Service.	20 Years' Service.		Prior to 5 Years' Service.	5 Years' Service.	10 Years' Service.	15 Years' Service.	20 Years' Service.
Major	\$2,500 00	\$208 33	10 per ct. \$229 17	10 per ct. \$250 00	20 per ct. \$270 83	\$291 67	\$1,875 00	\$156 25	\$171 87	\$187 50	\$203 12	\$218 75
Captain, mtd.	2,000 00	166 67	183 33	200 00	216 67	233 33	1,500 00	125 00	137 50	150 00	162 50	175 00
Captain, not mtd.	1,800 00	150 00	165 00	180 00	195 00	210 00	1,350 00	112 50	123 75	135 00	146 25	157 50
Regimental Adj't.	1,800 00	150 00	165 00	180 00	195 00	210 00	.....	.....	.....	.....	.....	.....
Regimental Q. M.	1,800 00	150 00	165 00	180 00	195 00	210 00	.....	.....	.....	.....	.....	.....
1st Lieutenant, mtd.	1,600 00	133 33	146 67	160 00	173 33	186 67	1,200 00	100 00	110 00	120 00	130 00	140 00
1st Lieutenant, not mtd.	1,500 00	125 00	137 50	150 00	162 50	175 00	1,125 00	93 75	103 12	112 50	121 87	131 25
2d Lieutenant, mtd.	1,500 00	125 00	137 50	150 00	162 50	175 00	1,125 00	93 75	103 12	112 50	121 87	131 25
2d Lieutenant, not mtd.	1,400 00	116 67	128 33	140 00	151 67	163 33	1,050 00	87 50	96 25	105 00	113 75	122 50
Chaplain	1,500 00	125 00	137 50	150 00	162 50	175 00	1,350 00	112 50	123 75	135 00	146 25	157 50

NOTE 1. An Aide-de-Camp to a Major General is allowed \$200 per year in addition to the pay of his rank, not to be included in computing the service increase.—[Act July 15, 1870, Sec. 24.] Section 1261, Revised Statutes.

" 2. An Aide-de-Camp to a Brigadier General is allowed \$150 per year in addition to the pay of his rank, not to be included in computing the service increase.—[Act July 15, 1870, Sec. 24.] Section 1261, Revised Statutes.

" 3. Acting Commissary of Subsistence is allowed \$100 per year in addition to the pay of his rank, not to be included in computing the service increase.—[Act July 15, 1870, Sec. 24.] Section 1261, Revised Statutes.

" 4. Assistant Surgeons are entitled to pay of Captain after five years' service.—[Act June 23, 1874, Sec. 4.]

" 5. Retired Officers receive 75 per cent. of pay (salary and increase) of their rank, but no increase accrues for time subsequent to date of retirement.—[Act July 15, 1870, Sec. 24.] Section 1274, Revised Statutes.

" 6. A retired Chaplain receives three fourths of the pay (salary and increase) of his rank (Captain, not mounted).

" 7. The Officer in charge of the public buildings and grounds (Washington) has, while so serving, the rank, pay, and emoluments of a Colonel.—[Act March 3, 1873, Sec. 1.]

" 8. The Aides-de-Camp to the General, selected by him from the Army, have, while so serving, the rank and pay of Colonel. [Section 1096, Revised Statutes.] The Aides-de-Camp and Military Secretary to the Lieutenant General, selected by him from the Army, have, while so serving, the rank and pay of Lieutenant Colonel. [Section 1097, Revised Statutes.]

" 9. Officers of the Army and of Volunteers, assigned to duty which requires them to be mounted, shall, during the time they are employed on such duty, receive the pay, emoluments, and allowances of Cavalry Officers of the same grade, respectively.—[Act July 17, 1862; Act February 27, 1877.]

" 10. Officers temporarily serving as Signal Officers shall receive, for the time they are so serving, the pay and emoluments of Cavalry Officers of their respective grades.—[Act February 22, 1862.] Still in force by decision of Second Comptroller, March 13, 1877.

" 11. The Examiner of State Claims in the Office of the Secretary of War shall have, while on such duty, the pay, emoluments, and allowances of mounted Officers, one grade higher than that held by him in his Regiment or Corps.—[Act July 23, 1879, Sec. 3.]

REMARKS.—Milage, at the rate of eight cents per mile, is allowed to Officers for travel under orders.—[Act July 24, 1876, Sec. 2.] Regulations governing the subject of milage are contained, entire, in General Orders No. 97, Adjutant General's Office, series of 1876, and No. 58, series of 1879.

Commutation of quarters to be paid by Pay Department, as follows: General, \$125 per month; Lieutenant General, \$70 per month; all other grades not to exceed \$10 per month per room.—[Act June 18, 1878, Sec. 9.] General Orders Nos. 37 and 66, Adjutant General's Office, series of 1878. The rate of commutation of quarters shall hereafter be \$12 per month per room.—[Act June 23, 1879.] General Orders No. 64, Adjutant General's Office, series of 1879.

TABLE "h." Pay of Officers and Cadets at the Military Academy.

(" Army Register.")

GRADE.	Grade, or Assimilated Pay.	Yearly Pay.	Acts of Congress Establishing Present Rates of Pay.
Superintendent	Pay of Colonel	See preceding Table.	{ June 12, 1858, Sec. 1; July 15, 1870, Sec. 24. [Section 1334, Revised Statutes.] March 3, 1851, Sec. 1; July 15, 1870, Sec. 24. [Section 1335, Revised Statutes.]
Commandant of Cadets	Pay of Lieutenant Colonel		
Adjutant	Pay of Regimental Adjutant		
Quartermaster and Commissary of the Battalion of Cadets	Pay of his grade in the Army ..		{ July 17, 1862, Sec. 1; July 15, 1870, Sec. 24; August 7, 1876. July 15, 1870, Sec. 24.
Treasurer	" " ..		
Surgeon	" " ..		
Assistant Surgeon	" " ..		{ July 15, 1870, Secs. 13 and 24; February 28, 1873. [Section 1336, Revised Statutes.] June 23, 1879, Sec. 4. April 29, 1812, Sec. 2; July 15, 1870, Sec. 24. [Section 1337, Revised Statutes.]
Professor, of more than ten years' service at the Academy	Pay of Colonel		
Professor, of less than ten years' service	Pay of Lieutenant Colonel		
Assistant Professor	Pay of Captain, mounted		
Senior Assistant Instructor of Tactics	" " ..	\$1,500 00	{ February 28, 1873. [Section 1336, Revised Statutes.] February 16, 1857, Sec. 2. [Section 1338, Revised Statutes.] April 1, 1864, Sec. 3; July 28, 1866, Sec. 8; February 28, 1867, Sec. 2. [Section 1339, Revised Statutes.] August 7, 1876; January 20, 1879.
Assistant Instructor of Tactics, commanding a Company of Cadets	" " ..		
Acting Assistant Professor	Pay of his grade in the Army ..		
Acting Assistant Instructor of Tactics	" " ..		
Instructors of Ordnance and Science of Gunnery and of Practical Engineering	Pay of Major		
Swordmaster	\$500 per annum and one ration per diem		
Cadet	\$540 per annum		

APPENDIX G (Continued).

TABLE "i." *Monthly Pay of Enlisted Men of the United States Army.*

(Sections 1280 to 1284, "Revised Statutes.")

("Army Register.")

YEAR IN EACH ENLISTMENT.....	FIRST ENLISTMENT.					FIRST REENLISTMENT.†				
						\$2 Extra.				
	1st Year.	2d Year.	3d Year.	4th Year.	5th Year.	1st Year.	2d Year.	3d Year.	4th Year.	5th Year.
	1st Year.	2d Year.	3d Year.	4th Year.	5th Year.	6th Year.	7th Year.	8th Year.	9th Year.	10th Year.
YEAR OF TOTAL CONTINUOUS SERVICE..	Retain nothing.	Retain nothing.	Retain \$1.	Retain \$2.	Retain \$3.	Retain \$1.	Retain \$1.	Retain \$1.	Retain \$1.	Retain \$1.
RANK AND SERVICE.										
COMPANY.										
Private—Artillery, Cavalry, and Infantry.....										
Private—(Second Class) Engineers and Ordnance.....	\$13	\$13	\$14	\$15	*\$16	\$18	\$18	\$18	\$18	\$18
Musician—Engineers, Artillery, and Infantry.....										
Trumpeter—Cavalry.....										
Wagoner †—Artillery, Cavalry, and Infantry.....	14	..	..	..	..	..	..	..	..	..
Artificer †—Artillery and Infantry.....	15	..	..	..	..	..	..	..	..	..
Corporal—Artillery, Cavalry, and Infantry.....	15	15	16	17	18	20	20	20	20	20
Blacksmith and Farrier—Cavalry.....										
Saddler—Cavalry.....										
Quartermaster Sergeant †.....	17	..	..	..	..	..	..	..	..	..
Sergeant—Artillery, Cavalry, and Infantry.....	17	17	18	19	20	22	22	22	22	22
Private—(First Class) Engineers and Ordnance.....										
Corporal—Engineers and Ordnance.....	20	20	21	22	23	25	25	25	25	25
First Sergeant—Artillery, Cavalry, and Infantry.....	22	22	23	24	25	27	27	27	27	27
Saddler Sergeant—Cavalry.....										
Sergeant—Engineers and Ordnance.....	34	34	35	36	37	39	39	39	39	39
REGIMENT.										
Chief Trumpeter—Cavalry.....										
Principal Musician—Artillery and Infantry.....	22	22	23	24	25	27	27	27	27	27
Chief Musician †—Artillery, Cavalry, and Infantry.....	60	..	..	..	..	..	..	..	..	..
Sergeant Major—Artillery, Cavalry, and Infantry.....	23	23	24	25	26	28	28	28	28	28
Quartermaster Sergeant—Artillery, Cavalry, and Infantry.....										
Sergeant Major and Quartermaster Sergeant—Engineers.....	36	36	37	38	39	41	41	41	41	41
Veterinary Surgeon § (senior).....	100	..	..	..	..	..	..	..	..	..
Veterinary Surgeon (junior).....	75	..	..	..	..	..	..	..	..	..
POST.										
Hospital Matron.....	10	..	..	..	..	..	..	..	..	..
Hospital Steward (First Class).....	30	30	31	32	33	35	35	35	35	35
Hospital Steward (Second Class).....	22	22	23	24	25	27	27	27	27	27
Hospital Steward (Third Class).....	20	20	21	22	23	25	25	25	25	25
Ordnance Sergeant.....										
Commissary Sergeant.....	34	34	35	36	37	39	39	39	39	39

* The pay of a man who has ever reenlisted under the Act of August 4, 1854, and who comes into the service again, commences with amount stated in this column—\$1 per month to be retained.

† Not affected by act of May 15, 1872. No pay retained in these cases; but they are entitled to benefits of Act of August 4, 1854, for reenlistment.

‡ Company Quartermaster Sergeants of any branch of the service not to be appointed (see General Orders No. 61, series of 1873), but reduction to be gradual by not filling vacancies.

§ Only one Veterinary Surgeon, at \$75 per month, allowed each of the Cavalry Regiments, from the First to the Sixth Regiment, inclusive; two, one at \$100 and one at \$75 per month, allowed each of the Seventh, Eighth, Ninth, and Tenth Regiments; the senior in date of appointment entitled to the higher grade.—*Decision of Adjutant General of December 3, 1874.*

¶ Subsequent reenlistments, \$1 more.

CLOTHING.—Settled June 30 and December 31 of each year. Balances found due United States to be charged soldier on muster-rolls of those dates. Balances due soldier to be carried forward on company books, credited to his current clothing account; any balance remaining due him at discharge to be credited on final statements.

For causes of withholding retained pay on discharge of the soldier, see Paragraph 10, General Orders No. 51, series of 1872.

Enlisted men of Signal Corps to have pay of Engineer soldiers of similar grades. Act approved June 20, 1878. (G. O. 46, A. G. O., 1878.)

APPENDIX G (Continued).

TABLE "k." *Military Geographical Divisions and Departments.**

("Army Register.")

1. DIVISION OF THE MISSOURI.—Departments of Dakota, of the Missouri, of the Platte, and of Texas; headquarters at Chicago, Illinois.
2. DIVISION OF THE ATLANTIC.—Departments of the East and of the South; headquarters at Governor's Island, New York Harbor.
3. DIVISION OF THE PACIFIC.—Departments of California, of the Columbia, and of Arizona; headquarters at Presidio, San Francisco, California.
4. DEPARTMENT OF WEST POINT.—The Military Academy and the post of West Point, New York; headquarters at West Point, New York.
5. DEPARTMENT OF THE EAST.—The New England States, the State of New York, excepting the department and post of West Point, New York, the States of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Ohio, Michigan, Wisconsin, Indiana, and the District of Columbia; headquarters at Governor's Island, New York Harbor.
6. DEPARTMENT OF THE MISSOURI.—The States of Missouri, Kansas, Illinois, and Colorado, and the Territory of New Mexico, Indian Territory, and the posts of Fort Elliott and Fort Bliss, Texas, including the town of San Elizario, on the Rio Grande, and that portion of El Paso County lying north of an east and west line passing immediately south of San Elizario; headquarters at Fort Leavenworth, Kansas.
7. DEPARTMENT OF THE PLATTE.—The States of Iowa and Nebraska, the Territories of Utah and Wyoming, and so much of the Territory of Idaho as lies east of a line formed by the extension of the western boundary of Utah to the northeastern boundary of Idaho, embracing the post of Fort Hall, Idaho Territory; headquarters at Fort O. naba, Nebraska.
8. DEPARTMENT OF DAKOTA.—The State of Minnesota and the Territories of Dakota and Montana; headquarters at Saint Paul, Minnesota.
9. DEPARTMENT OF CALIFORNIA.—The State of Nevada, and so much of the State of California as lies north of a line from the northwest corner of Arizona Territory to Point Conception, California; headquarters at Presidio, San Francisco, California.
10. DEPARTMENT OF THE COLUMBIA.—The State of Oregon, and the Territories of Washington, Idaho, and Alaska, excepting so much of Idaho as lies east of a line formed by the extension of the western boundary of Utah to the northeastern boundary of Idaho, embracing the post of Fort Hall; headquarters at Fort Vancouver, Washington Territory.
11. DEPARTMENT OF ARIZONA.—The Territory of Arizona, and so much of the State of California as lies south of a line from the northwest corner of Arizona Territory to Point Conception, California; headquarters at Whipple Barracks, Arizona Territory.
12. DEPARTMENT OF THE SOUTH.—The States of North Carolina, South Carolina, Georgia, Florida, Louisiana, Arkansas, Mississippi, Alabama, Kentucky, and Tennessee; headquarters at Newport Barracks, Kentucky.
13. DEPARTMENT OF TEXAS.—The State of Texas, excepting the posts of Fort Elliott and Fort Bliss, and that portion of El Paso County embraced in the department of the Missouri; headquarters at San Antonio, Texas.

NOTE.—The above roster is corrected to August, 1879.

* For the Military Posts see the weekly editions of "The Army and Navy Journal," where also the Companies, Regiments, etc., stationed thereat are quoted. See, also, "Annual Army Register," "The Army and Navy Register," and "Sunday Herald" (Army and Navy edition), Washington, D. C.

TABLE "l."

("Army Register.")

ARMORIES AND ARSENALS.

ARMORIES AND ARSENALS.	State.	Post-office.	ARMORIES AND ARSENALS.	State.	Post-office.
Springfield Armory.....	Massachusetts.....	Springfield.	New York Arsenal.....	New York.....	New York.
Allegheny Arsenal.....	Pennsylvania.....	Pittsburgh.	Pikesville Arsenal.....	Maryland.....	Pikesville.
Augusta Arsenal.....	Georgia.....	Augusta.	Rock Island Arsenal.....	Illinois.....	Rock Island.
Benicia Arsenal.....	California.....	Benicia.	Saint Louis Powder Depot.....	Missouri.....	Jefferson Barracks.
Fort Monroe Arsenal.....	Virginia.....	Old Point Comfort.	San Antonio Arsenal.....	Texas.....	San Antonio.
Fort Union Arsenal.....	New Mexico.....	Fort Union.	Vancouver Arsenal.....	Washington Territory...	Vancouver.
Frankford Arsenal.....	Pennsylvania.....	Philadelphia.	Washington Arsenal.....	District of Columbia...	Washington.
Indianapolis Arsenal.....	Indiana.....	Indianapolis.	Watertown Arsenal.....	Massachusetts.....	Watertown.
Kennebec Arsenal.....	Maine.....	Augusta.	Watervliet Arsenal.....	New York.....	West Troy.

RECRUITING DEPOTS.

Jefferson Barracks, Mo. | David's Island, N. Y. P. O., Pelham, N. Y. | Columbus Barracks, Columbus, Ohio.

ENGINEER DEPOT.

Willet's Point, N. Y. P. O., Whitestone, L. I.

NOTE.—The above list is corrected to August, 1879.

STATEMENT "n." *United States Military Academy.*

("American Almanac" and "Military Service Magazine.")

The United States Military Academy at West Point was founded by act of March 16, 1802, constituting the corps of engineers of the army a military academy with fifty students or cadets, who were to receive instruction under the senior engineer officer as superintendent. Later acts established professorships of mathematics, engineering, philosophy, etc., and made the academy a military body, subject to the rules and articles of war. In 1815, a permanent superintendent was appointed, and a year later an annual board of visitors was provided for, to be named by the President, the Speaker of the House, and the President of the Senate. In 1843 the present system of the appointment of cadets was instituted, which assigns one cadet to each Congressional district and territory in the Union, to be named by the Representative in Congress for the time being, and ten appointments at large, specially conferred by the President of the United States. The number of students is thus limited to 312. A large proportion of those appointed fail to pass the examination, and many others to complete the course, the proportion being stated at fully one half hitherto. The course of instruction requires four years, and is largely mathematical and professional. The discipline is very strict, even more so than in the army, and the enforcement of penalties for offenses is inflexible rather than severe. The whole number of graduates from 1802 to 1877 was about 2,700, of whom 1,200

are deceased and about 1,500 living. Of those surviving, 800 are still in the army, and about 700 out of service.

Appointees to the Military Academy must be between 17 and 22 years of age, at least five feet in height and free from infirmity, and able to pass a careful examination in various branches of knowledge. Each cadet admitted must bind himself to serve the United States eight years from the time of admission to the Academy. The pay of cadets, formerly fifty dollars per month and rations, was fixed at \$540 per year, with no allowance for rations by the Act of 1876. The aggregate amount of money appropriated by the United States for the Military Academy from 1802 to 1877 inclusive, was \$11,306,128 being an average of about \$149,949 annually. The number of actual members of the Academy by the official register of January, 1880, was 312.

WHENCE COME OUR OFFICERS?

"From an examination of the 'Army Register' for the current year (1879) I find that, of the 2,126 commissioned officers of the army, 1,123 have been appointed from civil life; 829 have been appointed from the Military Academy; 174 have been promoted from the ranks.

APPENDIX G (Continued).

STATEMENT "n" (Continued).

"The records show that on the average about four per cent. of the number of officers vacate their commissions in active service each year, due to death, resignation, or dismissal. This requires, on a basis of 2,126 officers to an army of 25,000 men—our present establishment—85 new appointments each year to fill the vacancies. The sources from which these come are: first, from *civil life*; second, from the *ranks* of the army; and third, from the *Military Academy*. As there are about 180 medical officers in the service, who are professionally educated for their positions, and of whose eminent qualifications there is no question, it is proper to leave this corps of officers out of the general consideration, and we have then about 1,946 officers, whose places are to be filled at the rate of 77 each year.

"Of the 1,123 officers now in the army, appointed from civil life, 984 have seen more or less active service during the War of the Rebellion, of which number about 37, by our estimated rate of decrease, are yearly passing out of service. In 25 years, therefore, the profession will have lost the benefit of their personal labors, though their example and experience will still remain as a legacy to their successors. . . .

"By a recent Act of Congress the Military Academy is the main source of our supply for officers, and this fact lends a great importance to its existence, its labors, its influence, and its necessities.

"While, since the close of the war in 1865, only about 140 officers have been appointed to the army from civil life, who have remained in service, the Academy has graduated 673 young officers, of which number 527 are still commissioned, while over 40 have been killed in action or have died from wounds or disease contracted in the line of duty.

"The average number of graduates per year since 1802 is 36.2; since 1842 is 41; and since 1865 is 48. The present organization of the Academy will not change this latter average very much either way, and we may then assume as the quota of officers supplied by the Academy to be for the present but 48 per year. This leaves about 29 officers to be furnished from civil life or by promotion from the ranks to make good the yearly deficit. . . .

"At present the number of graduates in service amounts to 40 per cent. of the entire number of officers, and this, with the one per cent. of increase each year, will at the end of ten years make the number of such officers equal to the number of non-graduate officers, and thereafter the graduates will have the advantage in point of numbers. . . .

"The records of the Academy permit us to go back only as far as 1838. From that time till 1879 the number of cadets appointed was 5,128. Of these, 609 either declined appointment, failed to report, or were found physically disqualified by the Medical Board, leaving 4,519 to present themselves for examination to the Academic Board in the English branches of a common-school education. The result of these examinations was that 932, or 20.6 per cent., were adjudged not duly qualified to enter upon their cadet life. Of the 3,205 admitted from 1838 to 1875, 1,716, or 53.4 per cent., have graduated. During the past ten years the failures for admission have become 37 per cent. of those examined, while the per cent. of graduates to the number admitted has risen to about 61, and is still on the increase."—"Education in its Relation to the Military Profession": Professor PETER S. MICHIE, *United States Military Academy*.

TABLE "o." *Established Colleges or Universities, with Officers of the Army serving thereat, under Section 1225, Revised Statutes.*

("Army Register.")

Agricultural and Mechanical College of Texas, Bryan, Tex.
Southern Illinois Normal University, Carbondale, Ill.
Indiana Asbury University, Green Castle, Ind.
Iowa State University, Iowa City, Iowa.
Kentucky University, Lexington, Ky.
Mississippi Military Institute, Aberdeen, Miss.
Massachusetts Agricultural College, Amherst, Mass.
Allegheny College, Meadville, Pa.
Cornell University, Ithaca, N. Y.
Hampton Normal and Agricultural Institute, Hampton, Va.
Ohio Agricultural and Mechanical College, Columbus, Ohio.
Western University of Pennsylvania, Pittsburgh, Pa.
University of Nebraska, Lincoln, Neb.
Tufts Academy and Pac. Univ'y, Forest Grove, Oreg.
Pennsylvania State College, Centre County, Pa.
Bishop Seabury Mission, Faribault, Minn.
Bowdoin College, Brunswick, Me.
Galesville University, Galesville, Wis.
Union College, Schenectady, N. Y.
Illinois Industrial University, Champaign, Ill.
Pennsylvania Military Academy, Chester, Pa.
University of Vermont, Burlington, Vt.
North Georgia Agricultural College, Dahlonega, Ga.
Louisiana State University, Baton Rouge, La.
Cornell College, Mount Vernon, Iowa.
Maryland Agricultural College, Prince George Co., Md.
Michigan Military Academy, Orchard Lake, Mich.
Brooks Military Academy, Cleveland, Ohio.
Western Reserve College, Hudson, Ohio.
University of Missouri, Columbia, Mo.

SEC. 1225. "The President may, upon the application of any established college or university within the United States, having capacity to educate, at the same time, not less than one hundred and fifty male students, detail an officer of the army to act as president, superintendent, or professor thereof; but the number of officers so detailed shall not exceed . . . [thirty] at any time, and they shall be apportioned throughout the United States, as nearly as may be practicable, according to population. Officers so detailed shall be governed by general rules prescribed, from time to time, by the President. The Secretary of War is authorized to issue, at his discretion and under proper regulations to be prescribed by him, out of any small-arms or pieces of field-artillery belonging to the Government, and which can be spared for that purpose, such number of the same as may appear to be required for military instruction and practice by the students of any college or university under the provisions of this section; and the Secretary shall require a bond in each case, in double the value of the property, for the care and safekeeping thereof, and for the return of the same when required."

SEC. 1260. "Any retired officer may, on his own application, be detailed to serve as professor in any college." [But, while so serving, such officer shall be allowed no additional compensation.]

I. The following regulations in regard to detail of officers of the army at established colleges and universities within the United States are prescribed by the President under the above laws:

1. Details "shall be apportioned throughout the United States as nearly as may be practicable according to population"; such States as do not contain sufficient population to entitle them to one officer will be grouped with one or more contiguous States or Territories, so that the combined population of the group will allow the detail of one or more officers, to the extent of thirty officers in all.

2. As a rule, captains of companies, regimental staff officers, or officers who have served less than three years with their regiments or corps, or who have recently completed a tour of detached duty, will not be eligible. No details will be made that will leave a battery, troop, or company without two officers for duty with it. The period of detail will not be longer than three years.

3. Retired officers, if acceptable to any institution, may, on their own request, be detailed on this duty among the thirty authorized. Besides this number, any retired officer may arrange to serve at a college or university without detail from or reference to the War Department; but, unless detailed under Section 1225, Revised Statutes, such service will not entitle the institution to the arms, etc., provided by that section.

4. No detail will be made for any institution except upon an application from its proper representatives, nor will any officer be so detailed unless acceptable to the authorities of the institution, who should make their selection from the officers available for this duty.

5. Applications for officers should be addressed to the Secretary of War, and should duly certify the number of male students the college or university has the capacity to educate, and should also be accompanied by the last printed catalogue.

6. Officers of the Army desiring a detail at colleges or universities may make application to the Adjutant General, through the usual military channels, for such details: their applications and the recommendations forwarded therewith will, if the officers are available, be furnished to such institutions as may desire to make a selection.

II. The following are the regulations prescribed by the Secretary of War for the issue of arms, etc., required for military instruction and practice at colleges and universities, under Section 1225, Revised Statutes:

1. The number of pieces of field artillery, with necessary implements, and of small-arms and accoutrements, which may be issued for the purposes of military instruction to each selected college and university having an officer of the army stationed thereat, is limited to the following, viz:

2 3-inch rifled guns, wrought-iron, model 1861, at \$450.	\$900 00	2 vent-covers, at 40 cents.	\$80 00
2 carriages and limbers, 3-inch gun, at \$325.	650 00	1 pendulum hausse, 3 inch.	2 50
2 gunner's haversacks, at \$3.35.	6 70	1 pendulum hausse scat.	60
2 handspikes, trail, at \$1.	2 00	1 pendulum hausse pouch.	75
4 lanyards, at 10 cents.	40	2 paulins, 12 by 15 feet, at \$11.75.	23 50
2 priming wires, at 10 cents.	20	150 Springfield "cadet" rifles, cal. 45, with appendages, etc., at \$18.	2,700 00
4 sponges and rammers, 3-inch, at \$1.	4 00	150 bayonet scabbards, steel, cadet, at 91 cents.	36 50
4 sponge-covers, 3-inch, at 30 cents.	1 20	150 waist belts and plates, at 50 cents.	75 00
2 tube-pouches, at \$1.50.	3 00	150 cartridge-boxes, cal. 45, at \$1.25.	187 50
4 thumbstalls, at 20 cents.	80		
2 tompons, 3-inch, at 30 cents.	60		

APPENDIX G (Continued).

TABLE "o" (Continued).

2. Issue of the above stores will be made by the Chief of Ordnance to any selected institution upon its filing a bond in the penal sum of double the value of the property, conditioned that it will take good care of and safely keep and account for the same, and will, when required by the Secretary of War, duly return the same within thirty days, in good order, to the Chief of Ordnance United States Army, or such officer or person as the Secretary of War may designate to receive it.

3. To conform to the requirements of the law, the terms "college" and "university" herein used are held to relate to "State institutions, incorporated or public," and not to "mere schools, private or municipal."

4. The following is the blank form of bond to be executed previous to the issue of ordnance and ordnance stores, viz.:

5. For practice-firing, the following allowances of ammunition will be made annually to each of the various institutions, viz.:

- 1,000 carbine metallic ball-cartridges, cal. '45.
- 1,000 metallic blank cartridges, cal. '45.
- 100 round blank cartridges for 3-inch gun.
- 300 friction primers.

This ammunition will be issued upon requisitions to be forwarded to the Chief of Ordnance by the presidents or superintendents of the institutions; and, as annual allowances date in all cases from July 1 of each year, requisitions should be forwarded before or as soon after that date as practicable for the prospective year's supply. Undrawn allowances of one year can not be drawn in the succeeding year.

6. Regular property returns will be rendered quarterly to the Chief of Ordnance, by each president or superintendent of an institution supplied with arms, etc., accounting for all ordnance and ordnance stores issued to the institution under his charge. These returns will be made on the blank forms to be supplied by the Chief of Ordnance.

7. Whenever any institution shall fail to return the public property in its charge within thirty days after demand made by the Secretary of War, the delinquency will be promptly referred to the Attorney General, that the bond of the institution may forthwith be put in suit.

8. All expense of repairs of stores are to be borne by the institution using the same, the Ordnance Department supplying spare parts for repairs at cost price.

(G. O. No. 100, Adjutant General's Office, November 21, 1879.)

STATEMENT "p." *The Navy of the United States.*

(Condensed from the Navy Register for 1879, and the Annual Report of the Secretary of the Navy, December, 1879.)

("American Almanac.")

There were in active service December 1, 1877, 45 vessels in commission, besides 16 which could be rendered efficient by slight repairs. There were 19 other naval vessels which could be fitted out in an emergency by adequate appropriations, making the fighting force of the navy 80 vessels. Besides there were 4 monitors (iron-clads) to be finished, and 8 tugs, or a total of 92 vessels. The number of guns is 1,125.

The active list of the navy is composed of 1 admiral, 1 vice-admiral, 11 rear-admirals, 23 commodores, 49 captains, 90 commanders, 79 lieutenant commanders, 280 lieutenants, 100 masters, 100 ensigns, 53 midshipmen, 35 cadet midshipmen, and 253 cadet midshipmen on probation at the Naval Academy, all of whom are officers of the line.

Of the staff, there are 1 surgeon general, 15 medical directors, 15 medical inspectors, 50 surgeons, 59 passed assistant surgeons, 39 assistant surgeons, 1 paymaster general, 13 pay directors, 13 pay inspectors, 50 paymasters, 30 passed assistant paymasters, 20 assistant paymasters, 1 engineer-in-chief, 69 chief engineers, 95 passed assistant engineers, 41 assistant engineers, 41 cadet engineers, and 104 cadet engineers on probation at the Naval Academy; 24 chaplains, 12 professors of mathematics, 1 secretary for the admiral, and 1 for the vice admiral; 1 chief constructor, 11 naval constructors, 5 assistant constructors, and 9 civil engineers.

The warrant officers consist of 55 boatswains, 59 gunners, 51 carpenters, 40 sailmakers, and 42 mates.

The retired list is composed of 40 rear admirals, 21 commodores, 16 captains, 11 commanders, 15 lieutenant commanders, 6 lieutenants, 14 masters, 7 ensigns, 2 midshipmen; 5 surgeons general, 17 medical directors, 1 medical inspector, 2 surgeons, 2 passed assistant surgeons, 3 assistant surgeons, 2 paymasters general, 5 pay directors, 3 paymasters, 2 passed assistant paymasters, 2 assistant paymasters, 7 chief engineers, 18 passed assistant engineers, 24 assistant engineers, 1 chief constructor, 3 naval constructors, 7 chaplains; 6 professors of mathematics; 9 boatswains, 5 gunners, 13 carpenters, and 11 sailmakers.

The active list is therefore composed of 1,075 officers of the line, 721 officers of the staff, and 247 warrant-officers—total, 2,043 officers of all grades.

The retired list is composed of 132 officers of the line, 104 officers of the staff, 38 warrant officers, and 6 professors of mathematics.

There were, July, 1879, in the service, provided for by the Navy Appropriation Act for the fiscal year 1880, 7,500 enlisted men and boys.

The Marine Corps consists of 86 officers and 1,500 enlisted men.

STATEMENT "q." *The United States Naval Academy at Annapolis.*

("American Almanac.")

The United States Naval Academy was opened October 10, 1845, and the credit of its foundation is attributed to Hon. George Bancroft, then Secretary of the Navy under President Polk. The course of instruction, designed to train midshipmen for the navy, at first occupied five years, of which three were passed at sea. Various changes have been made in the course of instruction, which was made seven years in 1850, four years in 1851, and six years (the two last of which are spent at sea) March 3, 1873, where it now remains. The Naval Academy, first located at Annapolis, Maryland, was removed to Newport, R. I., in May, 1861, but reestablished at Annapolis in September, 1865, where it now is, occupying lands formerly known as Fort Severn. The Academy is under the direct care and supervision of the Navy Department. There are to be allowed in the Academy one cadet midshipman for every member or delegate in the House of Representatives, appointed at his nomination, one for the District of Columbia, and ten appointed at large by the President. The number of appoint-

ments which can be made is limited by law to twenty-five each year, named by the Secretary of the Navy after competitive examinations, the cadets being from fourteen to eighteen years of age. The successful candidates become students of the Academy, and receive the pay of cadet midshipmen, \$500 per annum. Besides the cadet midshipmen, 25 cadet engineers may be appointed each year, from sixteen to twenty years of age, on competitive examination involving a higher standard of knowledge. The course for cadet engineers is four years at the Academy, and two additional years at sea. All cadets who graduate are appointed assistant engineers in the navy as fast as vacancies occur. The course of instruction is thorough, involving a close pursuit of mathematics, steam engineering, physics, mechanics, seamanship, ordnance, history, law, etc. The whole number of students, according to the Annual Register of 1878-'79, was cadet midshipmen, 268; cadet engineers, 102; total, 370. The graduating class of 1878 numbered 36 members.

TABLE "r."

NAVY YARDS OF THE UNITED STATES.

1. Brooklyn Navy Yard, Brooklyn, N. Y.
2. Charlestown Navy Yard, Boston, Mass.
3. Gosport Navy Yard, near Norfolk, Va.
4. Kittery Navy Yard, opposite Portsmouth, N. H.
5. League Island Navy Yard, 7 miles below Philadelphia.
6. Mare Island Navy Yard, near San Francisco, Cal.
7. New London Naval Station (incomplete), New London, Conn.
8. Pensacola Navy Yard, Pensacola, Fla.
9. Washington City Navy Yard, Washington, D. C.

FLEET STATIONS.

1. North Atlantic.....New York.
2. South Atlantic.....Rio Janeiro.
3. European Station.....Nice.
4. Pacific Station.....Panama and San Francisco.
5. Asiatic Station.....Yokohama.

For Commandants of Navy Yards, Flag Officers afloat, etc., see weekly edition of "Army and Navy Journal."

APPENDIX G (Continued).

TABLE "s." *Military Railroad Statistics.*

(Original.)

CASE.	CIRCUMSTANCES, REFERENCES, Etc.	DATA, Etc.																								
1.	A Regiment of Infantry requires (with impedimenta, etc.) "Infantry can enter a train and get under way in a very few minutes."—Soady.	<table><tr><td>Passenger Cars</td><td>16 to 18, not crowded.</td></tr><tr><td>Baggage " { Box</td><td>3 to 5 { = 3 to 12, not crowded.</td></tr><tr><td>Truck</td><td>0 to 6 {</td></tr><tr><td>Horse</td><td>6 to 12, if wagons go.</td></tr><tr><td>Engines</td><td>2 to 3.</td></tr></table>	Passenger Cars	16 to 18, not crowded.	Baggage " { Box	3 to 5 { = 3 to 12, not crowded.	Truck	0 to 6 {	Horse	6 to 12, if wagons go.	Engines	2 to 3.														
Passenger Cars	16 to 18, not crowded.																									
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Truck	0 to 6 {																									
Horse	6 to 12, if wagons go.																									
Engines	2 to 3.																									
2.	A Battalion of Cavalry (4 Squadrons) requires (with impedimenta, etc.) (Cattle Car holds 15 to 20 head) "It takes Cavalry from 20 to 25 minutes to fill a train."—Soady.	<table><tr><td>Passenger Cars</td><td>7 to 8, not crowded.</td></tr><tr><td>Baggage " { Box</td><td>2 to 5, " "</td></tr><tr><td>Horse, etc.</td><td>30 to 40, " "</td></tr><tr><td>Engines</td><td>2 to 3.</td></tr></table>	Passenger Cars	7 to 8, not crowded.	Baggage " { Box	2 to 5, " "	Horse, etc.	30 to 40, " "	Engines	2 to 3.																
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Baggage " { Box	2 to 5, " "																									
Horse, etc.	30 to 40, " "																									
Engines	2 to 3.																									
3.	A Battery of Artillery (6 guns) requires (with impedimenta, etc.) "Artillery requires at least half an hour to fill a train."—Soady.	<table><tr><td>Passenger Cars</td><td>1, not crowded.</td></tr><tr><td>Baggage " { Truck</td><td>12 to 20, " " { Men with</td></tr><tr><td>Box</td><td>1, " " { the guns</td></tr><tr><td>Horse</td><td>8 to 15, " " { and horses.</td></tr><tr><td>Engines</td><td>2 to 3.</td></tr></table>	Passenger Cars	1, not crowded.	Baggage " { Truck	12 to 20, " " { Men with	Box	1, " " { the guns	Horse	8 to 15, " " { and horses.	Engines	2 to 3.														
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Horse	8 to 15, " " { and horses.																									
Engines	2 to 3.																									
4.	An American "Box Car." (See Note 1.)	<table><tr><td>Weight</td><td>7 to 10 tons.</td></tr><tr><td>Carries General Stores</td><td>10 to 15 "</td></tr><tr><td>Contains</td><td>50 to 55 cubic yards.</td></tr></table>	Weight	7 to 10 tons.	Carries General Stores	10 to 15 "	Contains	50 to 55 cubic yards.																		
Weight	7 to 10 tons.																									
Carries General Stores	10 to 15 "																									
Contains	50 to 55 cubic yards.																									
5.	An American "Truck Car." (See Note 1.)	<table><tr><td>Weight</td><td>6 to 9 tons.</td></tr><tr><td>Carries General Stores</td><td>8 to 12 " (coal, etc.)</td></tr><tr><td>Contains</td><td>15 to 23 cubic yards.</td></tr></table>	Weight	6 to 9 tons.	Carries General Stores	8 to 12 " (coal, etc.)	Contains	15 to 23 cubic yards.																		
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Contains	15 to 23 cubic yards.																									
6.	An American Passenger Car.	<table><tr><td>Weights from</td><td>14 to 18 tons.</td></tr><tr><td>Will seat comfortably</td><td>56 persons.</td></tr><tr><td>Will hold (crowded)</td><td>75 to 80 (100?) men.</td></tr></table>	Weights from	14 to 18 tons.	Will seat comfortably	56 persons.	Will hold (crowded)	75 to 80 (100?) men.																		
Weights from	14 to 18 tons.																									
Will seat comfortably	56 persons.																									
Will hold (crowded)	75 to 80 (100?) men.																									
7.	An American Sleeper (Pullman).	<table><tr><td>Weights (loaded) from</td><td>25 to 30 tons.</td></tr><tr><td>Will berth { without crowding.</td><td>20 to 26 persons.</td></tr><tr><td>crowded</td><td>40 to 52 "</td></tr></table>	Weights (loaded) from	25 to 30 tons.	Will berth { without crowding.	20 to 26 persons.	crowded	40 to 52 "																		
Weights (loaded) from	25 to 30 tons.																									
Will berth { without crowding.	20 to 26 persons.																									
crowded	40 to 52 "																									
8.	A Passenger Engine will draw on a level about 14 Cars, will move at a slow speed on level probably 25 to 26 loaded Passenger Cars, weighs.	27 tons.																								
9.	It will draw 3 loaded Passenger Cars up a grade of 100' per mile, at 24 miles per hour.	60 "																								
	A Freight Engine will draw on a level at a slow speed about 100 to 125 loaded Cars, weighs (see Note 2).	30 "																								
	It will draw on a level at 15 miles per hour.	1,595 "																								
	It will draw up a grade 250' per mile, at 8 to 12 miles an hour.	118 "																								
10.	In this country from 6 to 16 Passenger Cars constitute "a train," and run on an average of.	25 to 35 miles per hour.																								
11.	In this country 16 to 22 Freight Cars go to form "a train," and run at the rate of.	15 to 20 " "																								
12.	There are. ("American Almanac.")	<table><tr><th>Miles of Railroad.</th><th>Miles of Sidings, Double Tracks, etc.</th><td></td></tr><tr><td>5,866</td><td>2,029</td><td>In New England.</td></tr><tr><td>14,777</td><td>9,386</td><td>" Middle States.</td></tr><tr><td>13,683</td><td>1,102</td><td>" Southern States.</td></tr><tr><td>41,733</td><td>6,779</td><td>" West and Southwestern States.</td></tr><tr><td>2,517</td><td>238</td><td>" Pacific States.</td></tr><tr><td>2,256</td><td>286</td><td>" Pacific Railroads.</td></tr><tr><td>80,832</td><td>22,818</td><td>" United States.</td></tr></table>	Miles of Railroad.	Miles of Sidings, Double Tracks, etc.		5,866	2,029	In New England.	14,777	9,386	" Middle States.	13,683	1,102	" Southern States.	41,733	6,779	" West and Southwestern States.	2,517	238	" Pacific States.	2,256	286	" Pacific Railroads.	80,832	22,818	" United States.
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80,832	22,818	" United States.																								
	The mileage increases annually at a minimum of about the rate of.	2,500 miles.																								
13.	There are, per mile of road, about. (Wolseley, and "American Almanac.")	<table><tr><th>United States.</th><th>Canada.</th><th>New York State.</th><td></td></tr><tr><td>236</td><td>21</td><td>243</td><td>Engines.</td></tr><tr><td>16</td><td>3</td><td>34</td><td>Passenger Cars.</td></tr><tr><td>470</td><td>295</td><td>363</td><td>Freight Cars.</td></tr><tr><td>514</td><td>....</td><td>....</td><td>Cars of all kinds.</td></tr></table>	United States.	Canada.	New York State.		236	21	243	Engines.	16	3	34	Passenger Cars.	470	295	363	Freight Cars.	514	Cars of all kinds.				
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16	3	34	Passenger Cars.																							
470	295	363	Freight Cars.																							
514	Cars of all kinds.																							

NOTE 1. By a Truck is meant a hopper or gondola car which will carry from 26,000 pounds minimum to 40,000 maximum; the latter referring to new cars now being built, or such other cars as are suitable to have sides raised to accommodate the 40,000 pounds lading. There are other gondolas or truck cars which will carry from 22,000 to 34,000 pounds lading. The cubic contents of the Truck Car are, of course, to be carried within the sides of the car. The load can be higher, depending upon the nature and weight of the lading.

" 2. Freight Engines on Pennsylvania Railroad will draw from 45 to 100 loaded cars on a level, according to their class; the smallest load per engine being 10 cars on the Tyrone Division, while the heaviest load on Susquehanna Division of Northern Central Railway is 100 cars.

" 3. "The experience gained during the American war shows that, to supply an army of 100,000 in the field by means of a single line of rails, the rolling stock should be in the proportion of 25 engines and 6 freight cars per mile (not including transportation of troops)."—Wolseley.

" 4. "Experience in the Franco-German war shows that, upon double tracks (Continental system), time is *not* gained in moving large bodies of troops and material by rail where the proportion of sabers and bayonets is greater than 435 per mile (English) to be gone over."—Soady.

" 5. "When establishing himself before Petersburg, General Grant made a railway about 9½ miles long in 11 days without any preliminary survey or work having been carried out."—Soady.

" 6. "In the preparation for the Italian war of 1859, the main line from Paris to Marseilles carried an average of 8,500 men and 500 horses a day. On one day 12,000 men and 650 horses were sent, the greatest number ever yet, as far as we can ascertain, transported by rail under the most favorable circumstances."—Soady.

" 7. Hooker's Corps, 23,000 men, with all its baggage, artillery, trains, and animals, was transported from the Rapidan to Stephenson, Ala. (1,192 miles), in 7 days.

" 8. For further statistics, see Hamley, Wolseley, General Railroad Statistics, Trautwine, Haswell, etc.

APPENDIX G (Continued).

TABLE "t." *Debts, Revenues, Expenditures, and Commerce of Nations.*

Compiled from the "Almanach de Gotha," the "Statistical Abstract of the United Kingdom," and from Official Documents. The figures are for the Latest Attainable Years as to each Country.

(Altered and Corrected from "Tribune Almanac," 1880.)

COUNTRIES.	Public Debt.	Revenue.	Expenditures.	Imports.	Exports.
Austria.....	\$2,005,150,000	\$186,776,170	\$202,035,039	\$258,450,000	\$204,800,000
Belgium.....	296,072,000	50,048,972	49,045,128	258,504,000	222,920,400
Brazil.....	368,351,139	72,548,454	67,789,297	88,045,520	104,232,800
Canada.....	112,248,378	22,700,000	24,100,000	93,200,000	89,851,328
Chili.....	50,677,600	21,294,383	22,052,187	39,050,197	37,139,961
China.....	3,200,000	230,000,000	.....	105,000,000	114,000,000
Denmark.....	48,790,000	13,464,066	13,074,620	50,311,240	33,933,640
Egypt.....	450,540,000	54,820,818	54,737,670	29,000,000	68,000,000
France.....	3,927,000,000	548,605,716	589,334,162	892,360,000	961,540,000
Germany.....	1,047,200,000	135,584,249	135,000,000	918,850,000	608,200,000
Great Britain and Ireland.....	3,704,470,000	398,825,180	412,017,475	1,969,695,885	1,265,883,010
Italy.....	1,944,460,000	279,550,000	278,121,440	265,899,000	213,371,000
Japan.....	145,000,000	63,120,600	62,993,850	24,087,515	27,669,465
Mexico.....	395,500,000	23,807,671	24,891,522	29,062,407	31,659,151
Norway.....	24,990,000	11,364,220	10,726,500	52,017,280	33,933,640
Peru.....	213,482,680	29,801,195	33,755,375	24,179,094	57,500,000
Persia.....	No Debt.	8,240,000	8,750,000	5,625,000	2,813,000
Portugal.....	392,700,000	29,568,816	29,720,336	38,131,520	26,448,600
Russia.....	2,856,000,000	489,377,280	490,557,403	365,426,400	286,484,000
Spain.....	2,499,000,000	131,500,000	131,824,000	66,670,000	75,564,000
Sweden.....	57,120,000	23,563,201	21,872,193	85,906,800	62,532,960
Switzerland.....	6,644,000	8,297,480	8,524,400	Not given.	Not given.
Turkey.....	1,190,000,000	88,764,050	140,000,000	72,430,000	51,000,000
United States.....	2,016,049,722	257,763,879*	236,964,327†	466,872,846	739,107,578

* The average Ordinary Revenues of the United States for the past 5 years (1875-'79) = \$273,327,986 25.

† " " Ordinary Expenditures " " " = 254,945,118 04.

" " Annual Savings " " " = 18,382,868 21.

"Among all the countries in Europe, England and the Netherlands only have reduced their Debt since 1865, and even in these exceptional cases the reduction has only been trifling. In the mean time the total Public Debt of Europe (which was some \$12,500,000,000 in 1865) has just about doubled (1880). On the other hand, the Public Debt of the United States has, during the same time, steadily and vastly diminished. In 1865 (August 31st) that Debt, as then audited, amounted to \$2,756,431,571, whereas on the 1st of December, 1879, it had diminished to \$2,016,049,722, a reduction of over \$740,380,000 in thirteen years. Again, every European State has increased its expenditures since 1865. The total cost of government for all Europe has risen since that year from about two to three billions per annum. The United States alone, among the great nations of the earth, has reduced its expenses during the past fifteen years. The expenses of our Government are also proportionately and actually less, per annum, than those of any other at all compared with it in the compass and importance of its functions." (See "Army and Navy Journal," March 13, 1880.)

The Secretary of the Treasury has just furnished to the Senate, in response to the resolution of March 8th, "an elaborate statement, showing the expenses of the Government 'on account of the War of the Rebellion, from July 1, 1861, to June 30, 1879, inclusive.' The statement exhibits the Gross Expenditures, the Ordinary Expenditures, and the Expenditures growing out of the war in all the various branches of the Service, either directly or indirectly affected by the war. The grand totals are as follows:

Gross Expenditures.....	\$6,796,792,509
Ordinary Expenditures.....	609,549,124
Expenditures growing out of the War.....	6,187,243,385

The principal items of the War Expenses are the following:

Interest on the Public Debt.....	\$1,764,256,198
Pay of Two and Three Years' Volunteers.....	1,040,102,702
Subsistence of the Army.....	381,417,548
Clothing of the Army.....	345,543,880
Army Transportation.....	336,793,885
Purchase of Horses.....	126,672,423
Other Quartermaster Expenditures (in round numbers).....	320,000,000
Army Pensions.....	407,429,193
Bounties (including Additional Bounties under the Act of 1866).....	140,281,178

And, in round numbers, the following:

Refunded to States for War Expenses.....	\$41,000,000
Purchase of Arms for Volunteers and Regulars.....	76,000,000
Ordnance Supplies.....	56,000,000
Expenses of assessing and collecting Internal Revenue.....	113,000,000
Expenses of National Loans and Currency.....	51,523,000
Premiums.....	59,738,000

"The War Expenditures for the Navy (including about \$74,500,000 for pay and \$6,500,000 for Navy Pensions) aggregate about \$412,000,000. Among the other detailed items of Expenditures growing out of the war are \$5,243,034 for National Cemeteries, \$8,546,185 for support of National Home for Disabled Volunteers, and \$88,000 for the purchase of Ford's Theatre, the scene of President Lincoln's assassination."—"New York Herald," June 10, 1880.

"The Expenditures of the Government for the year ending July 1, 1862, the first entire fiscal year of the War, were about \$475,000,000, or more than \$1,300,000 per day; for the year ending July 1, 1865, they were about \$1,290,000,000, or more than \$3,500,000 per day. These, during this last year of the war, were more than the whole expenditures of the Government from the inauguration of Washington to the inauguration of Buchanan!"—Goodrich's "History of the United States."

APPENDIX G (Continued).

TABLE "U." *Aggregate Issues of Paper Money in War Times.*

The following Table exhibits the amount *per capita* issued of the Continental money, the French *assignats*, the Confederate currency, and the legal-tender greenbacks and national bank notes of the United States.

("American Almanac," 1860.)

NATURE OF ISSUE.	Population.	Amount Issued.	Amount per Head.
		Dollars.	Dollars.
Continental money.....	3,000,000 in 1780.	359,546,825	119 84
French assignats.....	26,500,000 (France in 1790).	9,115,600,000	343 98
Confederate currency.....	9,103,332 (11 Confederate States, 1860).	654,465,963	71 89
		Highest amount in circulation, January, 1866.	
Greenbacks and national bank notes.....	31,443,321 (United States in 1860).	750,820,228	23 87

TABLE "V." *Giving Military Statistics concerning certain Selected Powers.*

(Compilation and Arrangement Original.)

COUNTRIES.	GENERAL STATISTICS.*						ARMY.				NAVY.		
	Area in 1,000s of Sq. Miles.	Population in Thou- sands.	Miles of Railroad in Operation.	Miles of Telegraph in Operation.	Peace Footing.	War Footing.	Number of Cannon Field Pieces.	Inhabit- ants per Soldier (Peace Footing).	Annual Military Expenses per Inhab- itant.	Per Cent. of Total Annual Budget (Military).	Number of Vessels of War.	Number of Men in Navy.	Tonnage of Steam Vessels in Merchant Marine, 1876-77.
Austria.....	240	37,350	6,979	28,148	296,218	1,051,421	1,230	127	\$1.72	68	68	6,319	55,382
Belgium.....	11	5,403	2,208	3,160	45,970	103,683	240	118	1.65	18	10	172	35,430
Brazil.....	3,275	10,108	1,324	3,510	16,500	32,000	...	674	2.12	35	63	6,184	...
Canada.....	3,484	3,602	4,929	10,995	40,000	655,000	...	100	.18	4	7	...	76,487
Chili.....	131	2,076	977	2,650	3,516	28,274	...	692	.96	15	15	840	6,225
China.....	3,925	500,000	10†	25	867,000	1,500,000	32 (?)	500	?	?	38	...	?
Denmark.....	15	1,912	819	1,591	35,699	48,982	200	57	2.12	42	35	1,125	39,478
Egypt.....	212	17,100	1,163	3,980	62,920	128,000	...	276	.26	8	14	...	?
England and Ireland.	121	34,242	17,092	25,206	233,872	557,711	1,400	136	4.68	41	531	81,447	2,005,000
France.....	202	36,906	14,078	33,895	494,105	1,750,000	2,964	72	3.92	30	226	50,517	205,420
Germany.....	212	42,727	18,471	24,103	418,821	1,303,603	2,550	102	2.16	32	60	8,051	183,569
Italy.....	113	27,769	4,849	45,557	220,690	869,316	1,640	125	1.56	17	66	11,880	57,881
Japan.....	150	33,625	67	1,841	35,000	49,378	180	1,000	.30	12	21	3,944	?
Mexico.....	762	10,000	403	5,760	22,387	...	100	410	1.02	42	4	...	?
Montenegro.....	18	286	?	200	30,000	...	102	5	.43	...	0	0	0
Norway.....	122	1,806	363	4,827	12,750	18,000	66	139	1.52	32	119	4,342	45,129
Persia.....	648	6,500	?	3,240	28,400	108,500	200	232	.56	38	...	...	?
Peru.....	502	2,700	1,744	608	13,200	...	...	208	...	...	18	...	1,768
Portugal.....	36	4,141	709	2,190	35,733	75,000	192	127	1.40	23	37	3,853	13,681
Russia (Proper)....	2,072	71,736	13,229	57,338	787,998	1,671,674	2,596	110	1.85	36	223	30,039	105,962
Spain.....	183	16,222	4,112	7,510	330,000	400,000	675	168	1.76	22	138	14,648	176,250
Sweden.....	171	4,429	2,517	6,094	36,495	156,970	258	123	1.40	37	141	6,141	63,865
Switzerland.....	15	2,759	1,341	4,015	106,102	203,263	348	36	1.18	53	0	0	0
Turkey.....	1,812	31,669	997	17,618	157,667	618,100	618	202	2.58	42	170	6,000	3,350
United States.....	3,608	†51,283	§81,841	¶94,714	26,914	¶3,759,693	**1,916	1,851	††.75	35	92	8,684	††1,176,172

* The authorities consulted in the compilation of the above table were "The Almanach de Gotha," 1878-'80; "The American Almanac," 1880, edited by G. L. Spofford, Librarian of Congress; "The Tribune Almanac," 1880; Upton's "Armies in Asia and Europe"; Green's "Report"; and numerous standard atlases and books of statistics. The figures given are very close and of latest attainable dates, and may be generally depended upon. Such statistics, however, are naturally variable. The number of "field pieces" given is no doubt very far short of those *actually possessed*, but includes all concerning which positive data have been obtained. It was desired to introduce into this table certain columns to show the comparative power of the several nations to produce the staple articles of food (breadstuffs, provisions, meat, etc.). Such generalization has unfortunately proved impracticable thus far. It may, however, be unhesitatingly stated that the resources of our country in these great items, which more than all else show a nation's capacity to *endure* war, are far superior to those of any other people. Our main exports are in these staple articles, and are thirty-two times in excess of our imports (\$10,000,000) therein. These find their way to all parts of the globe, so that a declaration of war against the United States is, *ipso facto*, a self-severance from a main base of supplies. On the other hand, the bulk of our imports is in mere luxuries, which in former times of patriotic war our people have given ample proof of their willingness to sacrifice. In this connection, however, we submit the two following tables, taken, through the courtesy of the "New York Tribune," from its almanac for the current (1880) year. An examination of these tables will show the present condition of our imports and exports and of our direct trade with the world, and thus assist the student in forming an opinion as to the relative disadvantages of war with the various foreign powers.

† The mean percentage of increase in the population of the United States between census gatherings since 1790, and taken consecutively is 33. The census of 1870 showed an aggregate population of 38,925,598. The mean annual emigration to the United States during the past 10 years is 271,172.

‡ One Road built in 1876, and *destroyed* by order of Government in 1877.

§ This is exclusive of sidings, double tracks, etc., of which Mr. Poor estimates there are 19,500 miles in the United States, making the total length of single track in our country equal to 101,455 miles on June 1, 1879. The mean annual increase for the past 15 years has been 3,259 miles of track.

¶ This does not include the railway lines of telegraph, of which no statement is published, and which would materially increase the mileage in the United States.

¶ See "American Almanac," 1880; also "Army Register," 1880.

** This is according to advices in round numbers received from the Chief of Ordnance, April 25, 1880, and is itemized, as follows: 800 Light 12-pdrs., 700 3"-Rifles, 100 4½"-Rifles, 300 Gatling Guns, 16 Hotchkiss's Revolving Cannon. 93,000 breech-loading small-arms are also reported on hand.

†† The average annual appropriation for the "war department" during the past 5 years has been \$37,770,775.82. The actual appropriation for "the army" this year (1879-'80) was only \$26,797,300. An examination of the amounts expended by European States for military and naval purposes during the years 1865 and 1880 shows that all, save Italy and Austria, have increased their expenses. In the mean time our own military expenses have decreased yearly.

†† In June, 1879, there were 17,042 sailing vessels belonging to the United States, with a tonnage of 2,422,813. The total tonnage of the country (including barges, canal boats, etc., so much used in transporting during the war) was 4,169,601, more than one half of which pertains to the Atlantic and Gulf States.

APPENDIX G (Continued).

TABLE "W." Foreign Trade of the United States. Values of the Leading Articles.

N. B.—For a Consideration of the Military Value of such Tables as "w" and "x," see Note * to the Preceding Table ("v").

("Tribune Almanac," 1880.)

IMPORTS.	YEARS ENDING JUNE 30.		
	1877.	1878.	1879.
Breadstuffs and other farinaceous food.....	\$8,241,385	\$8,514,005	\$10,614,173
Coal, bituminous.....	1,775,667	1,936,187	1,724,466
Coin and bullion, gold and silver.....	40,774,414	29,821,314	20,296,000
Coffee.....	53,634,991	51,914,605	47,356,819
Cotton, manufactures of *.....	18,923,514	19,081,037	19,928,310
Gloves, kid and leather.....	3,128,919	3,195,702	3,317,788
India-rubber and gutta-percha, manufactures of.....	325,113	242,564	174,137
Iron, bar.....	1,515,691	1,541,115	1,224,035
Iron, pig.....	1,556,415	1,250,057	1,924,128
Iron rails, iron and steel.....	1,464	530	70,071
Iron, scrap and old.....	148,201	105,992	122,571
Lead, pigs, bars, and old.....	702,240	353,936	62,908
Leather, tanned, of all kinds.....	4,589,713	3,784,729	3,667,564
Molasses.....	7,808,257	6,764,119	7,188,388
Sugar, unrefined.....	81,187,504	69,642,368	67,820,101
Tea.....	16,181,467	15,660,168	14,577,618
Tin plates.....	9,759,327	9,929,491	10,147,460
Tin, manufactures of.....	39,332	58,498	54,107
Wine, in casks.....	1,889,871	1,838,891	2,054,700
Wood, and manufactures of.....	4,245,306	4,307,660	3,307,660
Wool, unmanufactured.....	7,158,944	8,247,617	6,034,555
Wool, manufactures of.....	25,698,300	25,230,134	25,230,154
Total value of merchandise.....	451,323,126	437,051,532	445,777,775
Entered for immediate consumption.....	361,564,569	342,164,541	351,839,167
Entered for warehouse.....	123,314,677	116,924,696	105,433,771
Entered for interior ports.....	7,218,344	7,783,609	8,800,837
Brought in cars and other land vehicles.....	10,697,640	12,965,999	11,983,823
Brought in American vessels.....	151,834,067	146,499,282	143,590,353
Brought in foreign vessels.....	329,565,833	307,407,565	310,499,599
DOMESTIC EXPORTS.			
Breadstuffs, including wheat.....	117,806,476	181,774,507	210,355,528
Coal, bituminous and other.....	2,916,112	2,359,467	2,319,398
Coin and bullion.....	† 43,135,738	† 27,054,985	§ 17,555,035
Cotton.....	171,718,308	180,031,484	162,304,250
Cotton, manufactures of.....	10,235,843	11,435,628	10,853,950
Hides and skins other than furs.....	2,480,427	1,286,840	1,171,523
India-rubber and gutta-percha manufactures.....	219,582	304,747	289,114
Iron, bar.....	194,775	133,373	58,987
Iron, pig.....	89,029	140,148	85,949
Iron rails.....	243,811	324,986	177,151
Iron, other manufactures.....	7,561,934	9,882,707	9,142,412
Lead and manufactures of.....	49,835	314,899	280,771
Leather, tanned, of all kinds.....	8,167,301	8,077,659	7,769,069
Molasses.....	594,547	365,747	919,173
Oils, mineral, refined or manufactured.....	58,032,709	43,880,956	38,124,836
Provisions.....	114,991,759	123,459,986	117,857,425
Steel and manufactures of.....	6,378,490	3,485,579	3,485,579
Sugar, refined.....	4,586,698	4,508,148	6,164,024
Tobacco and manufactures of.....	32,020,214	28,484,182	28,215,240
Tin and manufactures of.....	87,057	116,274	103,467
Vessels sold to foreigners.....	195,802	289,481	128,495
Wine.....	40,632	38,728	49,775
Wood and manufactures of.....	18,444,037	16,776,381	16,276,411
Wool, raw and fleece.....	26,446	93,358	17,644
Wheat.....	47,135,562	96,872,016	130,701,079
Wool, manufactures of.....	291,837	438,554	338,615
Shipped in American vessels.....	156,030,514	159,772,720	122,589,538
Shipped in foreign vessels.....	515,104,208	557,743,327	588,713,718
Total amount of merchandise (mixed values).....	632,980,854	695,749,930	699,538,742
Gold value of merchandise.....	589,670,224	680,709,268	698,340,790
FOREIGN GOODS AND SPECIE			
Re-exported from the United States.			
Gold value of merchandise.....	12,804,996	14,156,498	12,098,651
Coin and bullion.....	13,027,499	6,678,240	7,442,406
Shipped in American vessels.....	8,795,700	6,778,904	5,835,801
Shipped in foreign vessels.....	15,250,495	11,840,237	11,995,915

* Includes hosiery, shirts, and drawers of value of \$4,997,335 in 1879, \$4,682,246 in 1878, \$3,804,520 in 1877, and \$4,682,871 in 1876.

† Made up thus: Gold bullion, \$1,084,536; gold coin, \$21,274,585; silver bullion, \$1,483,894; silver coin, fractional, \$620,147; trade dollars, \$8,672,596.

‡ Made up thus: Gold bullion, \$205,319; gold coin, \$6,420,351; silver bullion, \$1,064; silver coin, fractional, \$288,137; trade dollars, \$1,238,749.

§ Made up thus: Gold bullion, \$24,774; gold coin, \$4,120,311; silver bullion, \$11,880,045; silver coin, fractional, \$228,264; trade dollars, \$5,166,006.

APPENDIX G (Continued).

TABLE "X." *Total Declared Value of the Imports of Foreign Merchandise and Specie, and of the Exports of the Produce and Manufactures of the United States to each Country, in the Years ended June 30, 1878 and 1879.*

("Tribune Almanac," 1880.)

COUNTRIES.	1878.		1879.	
	Imports.	Exports	Imports.	Exports.
Argentine Republic.....	\$4,949,367	\$2,013,587	\$3,519,105	\$2,128,012
Austria.....	272,250	2,827,581	315,813	2,641,707
Belgium.....	3,982,842	22,388,075	4,209,232	28,522,401
Brazil.....	42,972,036	8,610,646	39,385,638	8,194,370
Central American States.....	3,070,389	1,479,788	2,497,134	1,483,389
Chili.....	670,466	1,977,450	642,715	1,256,023
China.....	15,895,379	11,460,698	16,565,979	4,661,957
Denmark.....	9,469	3,303,488	21,438	2,284,784
Danish West Indies.....	812,411	738,696	842,418	909,794
France.....	44,033,048	56,101,999	52,174,145	89,924,717
French West Indies and French Guiana.....	2,881,059	1,569,880	2,634,090	1,566,152
Miquelon, Langley, and St. Paul's Island.....	64	283,277	142	322,141
French Possessions in Africa, etc.....	112,124	374,452	116,289	335,680
Other French Possessions.....	233,195	276,494	171,042	410,046
Germany.....	31,808,253	54,111,249	35,565,217	57,412,277
England.....	109,621,257	307,319,235	101,142,121	298,015,471
Scotland.....	8,452,849	24,721,880	8,736,538	22,767,062
Ireland.....	1,768,579	61,201,791	2,093,107	42,231,113
Gibraltar.....	8,506	2,641,916	11,228	1,298,300
Nova Scotia, New Brunswick, etc.....	3,545,075	6,269,916	3,923,969	4,685,050
Quebec, Ontario, etc.....	22,091,003	27,049,737	21,619,714	24,768,418
British Columbia.....	2,020,787	1,294,237	1,919,478	1,375,529
Newfoundland and Labrador.....	314,326	1,126,604	413,783	1,239,317
British West Indies and Honduras.....	5,832,823	7,399,554	4,007,341	7,077,927
British Guiana.....	2,141,825	1,924,922	574,125	1,786,181
British East Indies.....	12,081,595	939,348	12,225,770	1,142,436
Hong Kong.....	2,232,663	8,591,158	1,653,350	8,711,604
British Possessions in Africa, etc.....	1,317,695	2,047,209	864,796	2,227,530
British Possessions in Australasia.....	1,185,905	6,479,193	792,550	7,171,815
Other British Possessions.....	36,865	212,525	6,334	137,286
Greece.....	276,445	4,888,104	409,328	285,019
Hawaiian Islands.....	2,688,430	1,783,696	3,264,564	2,509,898
Haiti.....	3,599,771	4,173,036	3,577,824	3,262,642
Italy.....	6,711,006	8,736,719	7,884,327	8,658,233
Japan.....	7,541,625	2,770,272	9,894,884	2,676,924
Liberia.....	80,153	104,192	63,360	130,929
Mexico.....	13,645,648	5,843,609	14,047,819	6,761,284
Netherlands.....	2,774,934	13,174,079	3,680,932	14,164,159
Dutch West Indies and Dutch Guiana.....	659,547	685,789	920,796	819,593
Dutch East Indies.....	4,568,515	1,456,362	5,435,331	1,477,510
Peru.....	2,078,296	980,641	2,370,557	1,305,362
Portugal.....	429,447	3,879,890	454,385	4,927,161
Azore, Madeira, and Cape Verde Islands.....	73,076	645,108	102,042	592,801
Russia on Baltic and White Seas.....	599,931	11,002,472	350,632	15,959,701
Asiatic Russia.....	70,636	97,777	312,118	765,762
San Domingo.....	575,153	631,396	657,509	803,315
Spain.....	3,265,646	8,200,840	3,334,241	12,527,329
Cuba.....	58,885,162	11,365,013	64,202,441	13,185,893
Porto Rico.....	5,047,049	1,504,931	4,809,241	1,883,026
Spanish Possessions in Africa.....	202,736	155,194	218,602	314,505
Other Spanish Possessions.....	7,890,928	69,913	5,534,367	189
Sweden and Norway.....	137,756	2,792,228	213,924	2,147,252
Turkey in Europe.....	2,891	384,919	.....	3,989,230
Turkey in Asia.....	428,096	632,180	543,330	364,902
Turkey in Africa.....	127,104	395,962	113,316	365,170
United States of Colombia.....	6,504,999	4,559,226	7,187,113	5,771,454
Uruguay.....	2,443,428	1,061,417	1,780,140	939,362
Venezuela.....	7,444,431	2,999,025	5,249,717	2,052,435
Other Countries and Ports in South America.....	.....	55,297	.....	92,747
Other Asiatic Ports and Countries.....	15,614	10,437	33,889	.....
Other African Ports and Countries.....	625,091	1,026,348	716,403	1,077,022
Other Islands and Ports.....	106,637	36,452	66,042	135,536
Total.....	* \$466,872,846	† \$722,811,815	‡ \$466,073,775	§ \$736,634,834

* This includes \$29,821,314 in gold and silver coin and bullion. England sent \$12,552,008; Quebec and British Columbia, etc., \$2,570,849; Mexico, \$8,394,146; Cuba, \$1,983,830.

† This includes \$27,061,865 in gold and silver coin and bullion, of which \$7,857,506 went to China, \$9,635,995 to England, and \$5,343,419 to Hong Kong.

‡ This includes \$20,296,000 in gold and silver coin and bullion, of which Mexico sent \$8,554,598; England, \$3,432,954; France, \$1,489,544.

§ This includes \$24,997,441 in gold and silver coin and bullion, of which \$14,185,207 went to England, \$2,010,280 to China, \$5,421,082 to Hong Kong.

APPENDIX I.

(Original.)

FACE OF THE DIE.	RATIO.																			
	11:1	10:1	9:1	9:2	8:1	8:3	7:1	7:2	7:3	7:4	7:5	6:1	6:5	5:1	5:2	5:3	5:4	4:1	4:3	3:1
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

APPENDIX K.

TABLE "a." *Of Losses per Company, Battery, and Squadron (Von Naumann's).*

("Das Regiments-Kriegsspiel," Berlin, 1877.)

TARGET.	Skirmish Line (Men 6 Paces apart). Single Horsemen.					Close Skirmish Line (Men 8 Paces apart).					Closest Skirmish Line (Men 1½ Paces apart). Field Artillery, with Regular Space between Pieces.					Infantry or Cavalry in Single Rank. Closest Skirmish Line with Small Supports. Cavalry in Swarms. Light Artillery at Regular Intervals.					Company Columns Infantry in Line of Battle. Cavalry in Line.					Infantry in Battalion and other Close Columns. Cavalry Columns.				
	A					B					C					D					E					F				
Number of Units Fired at.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Product, d, x, y.																														
2	2	1	—	—	—	4	2	1	—	—	8	4	2	2	1	12	6	4	3	2	20	10	6	5	4	40	20	13	10	8
4	4	2	1	1	—	8	4	2	2	1	16	8	5	4	3	24	12	8	6	4	40	20	13	10	8	80	40	26	20	16
6	6	3	2	1	1	12	6	4	3	2	24	12	8	6	4	36	18	12	9	7	60	30	20	15	12	120	60	40	30	24
8	8	4	2	2	1	16	8	5	4	3	32	16	10	8	6	48	24	16	12	9	80	40	26	20	16	160	80	53	40	32
10	10	5	3	2	2	20	10	6	5	4	40	20	13	10	8	60	30	20	15	12	100	50	33	25	20	200	100	66	50	40
12	12	6	4	3	2	24	12	8	6	4	48	24	16	12	9	72	36	24	18	14	120	60	40	30	24	240	120	80	60	48
14	14	7	5	3	2	28	14	9	7	5	56	28	18	14	11	84	42	28	21	16	140	70	46	35	28	280	140	93	70	56
16	16	8	5	4	3	32	16	10	8	6	64	32	21	16	12	96	48	32	24	19	160	80	53	40	32	320	160	106	80	64
18	18	9	6	4	3	36	18	12	9	7	72	36	24	18	14	108	54	36	27	21	180	90	60	45	36	360	180	120	90	72
20	20	10	7	5	4	40	20	13	10	8	80	40	26	20	16	120	60	40	30	24	200	100	66	50	40	400	200	133	100	80
22	22	11	7	5	4	44	22	14	11	8	88	44	29	22	17	132	66	44	33	26	220	110	73	55	44	440	220	146	110	88
24	24	12	8	6	4	48	24	16	12	9	96	48	32	24	19	144	72	48	36	28	240	120	80	60	48	480	240	160	120	96
26	26	13	9	6	5	52	26	17	13	10	104	52	34	26	20	156	78	52	39	31	260	130	86	65	52	520	260	173	130	104
28	28	14	9	7	5	56	28	18	14	11	112	56	37	28	22	168	84	56	42	33	280	140	93	70	56	560	280	186	140	112
30	30	15	10	7	6	60	30	20	15	12	120	60	40	30	24	180	90	60	45	36	300	150	100	75	60	600	300	200	150	120
32	32	16	11	8	6	64	32	21	16	12	128	64	42	32	25	192	96	64	48	38	320	160	106	80	64	640	320	213	160	128
34	34	17	11	8	6	68	34	22	17	13	136	68	45	34	27	204	102	68	51	40	340	170	111	85	68	680	340	226	170	136
36	36	18	12	9	7	72	36	24	18	14	144	72	48	36	28	216	108	72	54	42	360	180	113	90	72	720	360	239	180	144
38	38	19	13	9	7	76	38	25	19	15	152	76	50	38	30	228	114	76	57	45	380	190	115	95	76	760	380	252	190	152
40	40	20	13	10	8	80	40	26	20	16	160	80	53	40	32	240	120	80	60	47	400	200	117	100	80	800	400	265	200	160

MISCELLANEOUS TABLES.

Table showing the Various Distances, in Yards, represented by Inches and Parts of Inches, on Maps at a 10-Inch Scale.

(Original.)

$\frac{1}{8}$ of an inch = 22 yards.	3 inches = 528 yards.	11 inches = 1,936 yards.	19 inches = 3,344 yards.	27 inches = 4,752 yards.
$\frac{1}{4}$ " = 35 "	4 " = 704 "	12 " = 2,112 "	20 " = 3,520 "	28 " = 4,928 "
$\frac{3}{8}$ " = 44 "	5 " = 880 "	13 " = 2,288 "	21 " = 3,696 "	29 " = 5,104 "
$\frac{1}{2}$ " = 59 "	6 " = 1,056 "	14 " = 2,464 "	22 " = 3,872 "	30 " = 5,280 "
$\frac{5}{8}$ " = 88 "	7 " = 1,232 "	15 " = 2,640 "	23 " = 4,048 "	31 " = 5,456 "
$\frac{3}{4}$ " = 132 "	8 " = 1,408 "	16 " = 2,816 "	24 " = 4,224 "	32 " = 5,632 "
1 inch = 176 "	9 " = 1,584 "	17 " = 2,992 "	25 " = 4,400 "	33 " = 5,808 "
2 inches = 352 "	10 " = 1,760 "	18 " = 3,168 "	26 " = 4,576 "	34 " = 5,984 "

Table showing the Map-Spaces, at Various Scales, which correspond to Different Distances, in Yards, etc.

(Original.)

	4"=1 Mile.	5"=1 Mile.	6"=1 Mile.	8"=1 Mile.	10"=1 Mile.	12"=1 Mile.		4"=1 Mile.	5"=1 Mile.	6"=1 Mile.	8"=1 Mile.	10"=1 Mile.	12"=1 Mile.
1 yard.	"	"	"	"	"	"	165 yards.	"	"	"	"	"	"
5 yards.	·00227	·0028	·0034	·0045	·0056	·0068	180 "	·35	·45	·62	·7	·92	1·25
10 "	·0113	·014	·019	·0227	·028	·038	220 "	·41	·5	·68	·81	1·01	1·37
25 "	·0227	·028	·038	·0454	·056	·076	320 "	·5	·62	·84	1	1·23	1·67
50 "	·0465	·07	·095	·1125	·14	·19	440 "	·73	·9	1·22	1·44	1·79	2·43
86 "	·093	·14	·19	·186	·28	·38	700 "	1	1·23	1·67	1·89	2·46	3·34
100 "	·195	·24	·292	·39	·48	·58	$\frac{1}{2}$ mile.	1·59	1·96	2·66	3·15	3·92	5·32
110 "	·227	·28	·38	·45	·56	·76	$\frac{1}{4}$ "	1	1·25	1·5	2	2·5	3
150 "	·23	·31	·42	·5	·62	·84	$\frac{1}{2}$ " ..	2	2·5	3	4	5	6
	·32	·41	·57	·64	·84	1·14	1 " ..	4	5	6	8	10	12

Table showing the Degrees corresponding to Certain Slopes, and vice versa.

(Original.)

1 on 100 = 35'	1 on 8 = 7° 08'	3 on 5 = 31° 03'
1 " 50 = 1° 09'	1 " 7 = 8° 6'	2 " 3 = 33° 41'
1 " 25 = 2° 18'	1 " 6 = 9° 27'	3 " 4 = 36° 56'
1 " 20 = 2° 50'	1 " 5 = 11° 18'	5 " 2 = 38° 12'
1 " 15 = 3° 48'	1 " 4 = 14° 02'	5 " 6 = 39° 48'
1 " 12 = 4° 46'	1 " 3 = 18° 26'	9 " 10 = 42°
1 " 10 = 5° 43'	2 " 5 = 21° 48'	1 " 1 = 45°
1 " 9 = 6° 20'	1 " 2 = 26° 33'	

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